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OF

ZOOLOGY, BOTANY, AND GEOLOGY.

(BEING A CONTINUATION OF THE 'MAGAZINE OF ZOOLOGY AND BOTANY,' AND
SIR W. J. HOOKER'S 'BOTANICAL COMPANION'.)

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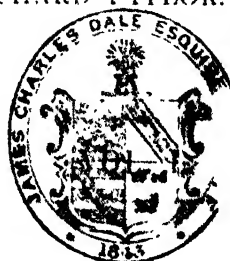
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AND

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"Omnes res creatæ sunt divinæ sapientiæ et potentiæ testes, divitiæ felicitatis humanæ. ex harum usu *bontas* Creatoris; ex pulchritudine *sapientia* Domini; ex æconomia in conservatione, proportionem, renovatione, *potentia* majestatis elucet. Earum itaque indagatio ab hominibus sibi relictis semper æstimata, a verè eruditis et sapientibus semper exulta; male doctis et barbaris semper inimica fuit."—
LINN.

PROSPECTUS.

IN undertaking the **ANNALS OF NATURAL HISTORY**, the Editors are desirous of making them not merely a vehicle for original communications pertaining to the entire subject of Natural History, but a means of enabling their readers to keep pace with the progress of the science in every stage of its advancement.

Memoirs on Descriptive Zoology ; Monographs ; characters of new Genera and Species ; notices of the habits, instinctive faculties, and geographical range of animals already known ;—as also Zootomical communications, in so far as they serve to correct or confirm the systematical station of species or entire groups, will occupy a due share of this Journal.

With regard to the Vegetable Kingdom, besides the space which will be devoted to Monographs and to Descriptive Botany, attention will also be given to Vegetable Physiology and Phytotomy. To all Naturalists, even to those who do not make Botany their peculiar study, these subjects must be interesting, and indeed indispensable for the acquirement of a general proficiency in Natural History. A portion of our pages, therefore, will be especially devoted to them, as well as to all that pertains to the accurate characters of Families, their geographical range, their uses in the arts, and in medicine.

* The investigation of Fossil Organic Remains stands in such intimate connection with Zoology and Botany, that the claim

of this subject to a place in this Journal has not yet been questioned. Due attention will therefore be given to those departments of descriptive Geology that come within the province of Natural History.

Biographical sketches of illustrious Naturalists, and those who have travelled for the sake of advancing science, will be occasionally introduced; and the Editors also hope to be enabled to furnish the reader with matter of popular and general interest supplied by the correspondence of Naturalists who are engaged in voyages of discovery.

Reviews of new works, and Notices of the most important British and Foreign Publications connected with any of these subjects, will be regularly brought before our readers.

From the Foreign sources of Intelligence, which in Natural History are abundant and valuable, such a selection will be made as may give early and copious information of the labours and discoveries of the Naturalists of other countries.

The kind assurances of co-operation which the Editors have received from eminent Naturalists, both in this country and abroad, warrant them in already entertaining a confident hope that this Periodical will prove in no degree inferior in interest and utility to those of the highest reputation on the Continent; and they rely on the favourable disposition of those to whom such a work may seem desirable for the support and encouragement requisite for its success.

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ERRATA.

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| Page 56, line 20, for <i>Luzon</i> , read <i>Luzon</i> |
| — 62, 6 lines from bottom, for <i>Mutisa</i> , read <i>Mutisa</i> |
| — 63, first line, for <i>Castilla</i> , read <i>Castilla</i> |
| — 63, line 11, for <i>Schomburgk</i> , read <i>Schomburgk</i> |
| — 66, line 3 of note, for <i>Parana</i> read <i>Parana</i> |
| — 71, line 18, for <i>Coregonus Maranula</i> , Jaid, read <i>Coregonus Maranula</i> Jaid |
| — 75, line 7, for <i>Dr Pownell</i> , read <i>Dr Pownell</i> |
| — 82, line 9 and 10, omit though it is quite clear that his observations, as far as they go, are substantially the same as my own |
| — 96, line 12, for fruit-bearing hairs, read branchlets |
| — 152, line 13, for <i>Adnabanchia</i> , read <i>Adnabanchia</i> |
| — 182, line 9 from bottom, for king, read ring |
| — 181, line 19 from top, for hunting, read haunting |
| — 180, line 2 of note, instead of for, read from |
| — 186, line 10 of note, and at p 198 and 192, for Rutly read Rutty |
| — 191, line 14, after Esq read of Dublin |
| — 195, line 15, for hairs, read hairs |
| — 238, line 24, for thorny, read horny |
| — 411, line 9, for spine, read spire |

ANNALS

OF

NATURAL HISTORY.

1.—*On a new Oscillatoria, the colouring substance of Glaslough Lake, Ireland.* By JAMES L. DRUMMOND, M.D.,
Professor of Anatomy in the Royal Belfast Institution, &c.

HAVING in the month of June last paid a visit to a friend resident at Glaslough, in the county of Monaghan, I embraced the opportunity of inquiring into the origin of the name of that place. It is a small town built on the borders of a lake, which occupies an area of about one hundred acres in extent, and from it the town has its name. Glaslough signifies in the Irish language “the green lake,” an appellation given to it from time immemorial, on account of the hue of its waters, which exhibit a green tinge equal to, or exceeding in intensity, that of the sea, though it is not at all times equally striking.

The opposite banks of the lake, which are high but not rocky, are thickly clothed with a wood of noble trees, and on my first seeing this beautiful sheet of water I was inclined to suspect that its green colour might arise simply from the reflexion of the rich foliage on its surface. On further inquiry, however, I ascertained that the colour resided in the water itself, and was owing to what I believe is an undescribed *Oscillatoria*.

When a little of the water is lifted in the hand it seems perfectly transparent, and it appears equally clear at the edges of the lake, in a depth of not more than a few inches, and there the pebbles at the bottom show perfectly distinct, without any intermediate cloud to obscure them. But at a depth of two feet the bottom is undistinguishable, and the water presents a sort of feculent opacity, accompanied with a dull, dirty, green-

ish hue. On lifting some of this in a glass, it seems at first sight quite transparent, but on holding it up to the light, innumerable minute flocculi are seen floating through every part of it, and producing a mottled cloudiness throughout the whole.

On examining these under the microscope their nature was at once obvious; they consisted of excessively fine simple fibrillæ belonging to some species of *Oscillatoria*. On inquiry among my friends at Glaslough, I found that several theories were entertained respecting the green tinge of the lake, very wide of its true cause: according to one surmise it was owing to some mineral impregnation, probably of a copper mine at the bottom of the water; and another, equally unfounded, attributed it to the drainings of a tan-yard running from the town.

At first I could only find the plant diffused through the water, as above mentioned; but at length I discovered a wet ditch extending from the lake into an adjoining field, and there it appeared swimming on the surface in large masses several inches in thickness, and above a foot and a half in length. These seemed evidently to be produced by an agglomeration of the filaments floated in from the lake, matted together at the surface and increased in growth. The masses thus formed had a considerable degree of toughness, and were so slippery that they could not be lifted out on the point of a stick. The surface of these masses where dried by the contact of the air was of a bright blueish verdigris hue, while the parts immersed in the water were of a dull opaque green.

That these masses were formed by an aggregation of filaments which had previously floated through the lake, but now being freed from the agitation of the waves were allowed to congregate in the motionless water, I would infer from the tendency they show, when undisturbed, to ascend to the surface. This tendency I ascertained, not from any experiment of my own, but from the fact, familiar to every inhabitant of Glaslough, that when the water of the lake (which is much used for washing and other domestic purposes) has stood at rest in a vessel for a night or two, a green scum spreads over its surface, which it is usual to remove before use, either by

skimming as cream is skimmed off milk, or by straining the water through a fine cloth.

Masses similar to those I found in the ditch are often seen floating at the sides of the lake, or cast ashore in large quantities; but I could not ascertain with precision from the accounts I received, whether this took place especially at some seasons, or whether at all times after a continuance of calm weather. I am disposed to conjecture that the latter is the case; but on this head I could determine little from my own observation, as during the greater part of my visit the weather was wet and blustery, and calms of very short duration. The lake too was said to exhibit much less of the green tinge than is often observable. That the agglutinated masses alluded to are much more copious in the lake at some times than at others, is illustrated by a remark used by the inhabitants of its neighbourhood on their appearance, viz. that "the lake is purging itself."

In the hope of detecting the stratum, if indeed there be any such, from which the floating filaments in the lake might have their origin, I attempted in a boat, in company with my friend the Rev. Mr. Smith of Glaslough, to bring up some debris from the bottom. Our instrument for dredging was indeed very imperfect, being only a fagot of branches with a weight attached. We tried various depths from forty-five feet (which seems to be the deepest part) to three or four, but the experiment was altogether fruitless, our instrument coming up as clean in general as it went down, and without any trace of the object of our search.

Some years ago the late Colonel Leslie put a number of swans upon the lake, one only of which now remains, and it was observed that while they continued on it the peculiar properties of the place were lost. This however can only, I presume, refer to the disappearance of the glutinous masses, which the birds had devoured as fast as they were formed.

Another observation which I have to make is, that although the County Monaghan abounds in lakes, the phenomena now mentioned are peculiar to this alone, at least such was the confident assertion of every one with whom I conversed on the subject; and there is a beautiful little sheet of water called Kel-

vey Lake, the only one which I had an opportunity of examining, situated about a quarter of a mile from Glaslough, in which I could trace no similar appearance.

The history now given of the Glaslough *Oscillatoria* bears a striking resemblance in some points to that of the *O. rubescens* of the Lake Morat in Switzerland, as described by De-candolle in the third volume of the *Mémoires de la Société de Physique et d'Histoire Naturelle de Genève*, from which I select the following particulars. It is stated in that account that the lake Morat during every spring presents the appearance of a reddish scum upon its surface, which the fishermen express by saying that the lake *is in flower*. But in the spring of 1825 this phenomenon was so very remarkable as to strike with astonishment the inhabitants of its banks, and an article published by Dr. Engelhardt respecting it excited the attention of the Swiss naturalists, especially those of Geneva. In the year stated, the red appearance continued from the month of November till May, and its unusual exuberance was supposed to originate from the great mildness of the winter, and the consequent smaller elevation of the water of the lake being favourable to the development of the matter, which was evidently organic, and caused the redness.

During the early hours of the day the lake presented nothing remarkable, but soon after there appeared long, red, very regular and parallel lines along its borders and at some distance from the shore; the breezes urged this matter into the little creeks, and heaped it up around the reeds. There it covered the surface of the lake like a fine reddish scum, forming patches of colours varying from greenish black to a beautiful red; it was also seen of a yellow, a red, and grey of every shade; some of them were marbled, and others presented figures much resembling those produced by positive electricity on the electrophorus. During the day this mass exhaled an infectious odour, but during the night all disappeared, to be renewed on the following day.

When the lake was agitated by strong winds, the phenomenon disappeared, but again presented itself on the re-establishment of a calm.

Many species of fish, as perch and pike, probably from ha-

ving eaten of this matter, had their bones and flesh tinged red as if they had been fed on madder, but without any inconvenience, as was remarked by Dr. Engelhardt. The same observer and M. Frechsel relate that other small fishes, which came to the surface for air, or in pursuit of flies, perished after some convulsions when they traversed this matter, either, according to some, from having eaten of it, or according to others from the mephitic gas at the surface*.

In the *Oscillatoria* of Glaslough, the thick conglomerated masses had a heavy but nothing of a mephitic odour like that of *O. rubescens*, and the plant, so far as I could learn, seemed to have no evil influence on any species of animal, the lough abounding in pike, eels, roach, and perch. I also observed sticklebacks in the shallow parts, and I believe there are also some trout. I found *Helix stagnalis* and some other lacustrine shells in abundance, and coots and water-hens were numerous.

From the accounts I received, the green colour is evident in the lough throughout the year, and if I may judge from my own observation, every drop of it is impregnated with the oscillatory filaments. On examining specimens in the microscope, I sometimes observed their motions to be very vivid, and in other instances little or no motion could be perceived. They are extremely minute; their transverse striæ very numerous, and at distances of about half a diameter from each other.

The filaments in the conglomerated masses appeared to me to be many inches long, and running parallel together; the broken fragments dispersed through the lake cross each other in all directions. Presuming that this is an undescribed species, I would suggest the specific name *arugescens*, from its assuming the blueish verdigris colour on drying, as being the most characteristic appellation.

I have only to remark further, that I could perceive nothing peculiar about the lake at Glaslough to which might be attached a conjecture as to the growth of one aquatic more than another; the shore being in some places composed of shelving clay banks, in others flat and muddy, and in others of small calcareous stones and gravel: one considerable portion is of peat-bog. Among the plants fringing its edge I observed *Arundo*

* Lib. cit. part. sec. p. 29 et seq.

Phragmites, *Hippuris vulgaris*, *Menyanthes trifoliata*, *Alisma Plantago*, *Equisetum limosum* and *palustre*, *Scirpus lacustris*, *Chara hispida*, *Nymphæa alba*, and several others.

The following are all the characteristic marks of this species that I can recollect.

O. ærugescens, Filaments extremely slender, opaque green, conglomerated in large toughish glutinous masses in sheltered calm situations, and nearly floating on the surface; in more open exposures broken into innumerable fragments, and suspended like cloudy flocculi in the water. Striæ numerous, at distances of about half a diameter apart from each other. Oscillatory motion often lively. Colour when dried a beautiful æruginous blue; adheres strongly to paper, exhibiting a glossy surface; filaments expanding by moisture so as to seem recent, and sometimes resuming the oscillatory motion.

Hab. Lake at Glaslough, County Monaghan, Ireland.

Belfast, August 14, 1837.

II.—Some Remarks on the Germination of *Limnanthemum lacunosum*. By Dr. GRISEBACH.

[With a Plate]

WHEN I was preparing a year and a half ago a monograph on the *Gentianeæ*, I ventured to hope that my endeavours would be furthered by the assistance of such botanists as have larger materials at their disposal, this being the spirit of a science whose followers seem to participate in that bountiful and tranquilly working principle which reigns over the Vegetable Creation. Far from finding myself disappointed in these views, I have received everywhere the most liberal, generous, and disinterested support; and am only anxious lest my labours should not correspond with the unparalleled confidence which some of the most eminent naturalists were kind enough to show me. Among the very rich collections of *Gentianeæ* belonging to Sir Wm. J. Hooker, all of which he entirely entrusted to me by sending them hither, there were germinating specimens of *Limnanthemum lacunosum*, (*Villarsia*, Vent.)



collected at Boston, North America, by Mr. Greene, which, as they seem to afford a new example of very unequal cotyledons, are the more entitled to particular investigation, since the fuller development and the petiolar inflorescence of that genus has long excited the curiosity of botanists. I was able to examine two germinating specimens hanging still to their seeds; but unfortunately neither was quite entire, though one, however, perhaps* explains the other. One plant (Plate I. fig. 1.) is in a very young state; it consists of the seed, which is laterally opened and encloses a small dark body, viz. one of the cotyledons, connected with the radicle by a very short petiole; the radicle is an inch long, very slender, and descends parallel to the seed: opposite to this enclosed cotyledon, rises, in an oblique direction, a very fine white filament, almost as long as the radicle, but mutilated or torn off at its tip. In the other specimen (fig. 2.), the radicle of which is very short and evidently in an injured state, this filament is almost two inches long, white, cylindrical, and scarcely half a line in diameter, and ends here in an oblong body, out of which three cylindrical long roots descend, while a petiole with its leaf and the rudiments of a second ascend from it. Though it cannot be quite determined whether that oblong body has a foliaceous nature, nevertheless it seems certain that it embraces the base of the petiole, as well as that the roots arise from the same point: therefore I cannot but consider that body as the other cotyledon, at the top of whose petiole, the germs of the new plant originate. For, first, the filament, which I think to be the petiole of the cotyledon, stands opposite to the cotyledon, inclosed in the seed, and has that situation towards the radicle, which cotyledons always have in exogenous plants. Secondly, *Trapa* affords a similar instance of unequal cotyledons. Thirdly, the more advanced vegetation of *Limnanthemum* shows the strongest analogy with such a formation of petiolar development as that alluded to; namely, the seed and its filament being obliterated, more and more roots and leaves grow from the same point (fig. 3.), till one petiole attains a much greater length than the others (fig. 4.); this petiole, commonly half a foot high, while the rest are scarcely more than an inch, develops soon, not far from the origin of

the leaf, a new set of germs, some of which descend and form small and somewhat thick roots, of a very simple cellular tissue, while others put forth peduncles and flowers. Such a process is often repeated, for when the plant is in its full vigour and its base has become a thick rhizoma*, as many as twenty long petioles are not unfrequently to be met with, the leaves of which float as well as the flowers, the latter rising from the upper part of each petiole, all at the same point and opposite to petiolar roots. In some other species of this genus, viz. *L. cristatum*, between the floral buds not unfrequently one large branch shoots forth which does not end in a flower, but grows laterally to a great length and produces another leaf, which again bears floral buds and roots in the same way near the top of the petiole. It may easily be conceived that the development of buds on those points is highly analogous to the origin of the young plant from the petiolar top of the long-stalked cotyledon. Besides, it seems clear enough that the formation of germs from the petiole is owing to an union of a cauline organ with the petiole, as well as of the plumule with the cotyledon in the latter case.

If we compare this germination, if correctly understood, with that of *Trapa*, we see here also one cotyledon inclosed by the nut and the young plant at a great distance from it; but here is this remarkable difference, that the inclosed cotyledon is the long-stalked one, while the other is most obliterated, and that the plant grows in the common way from the axis of both cotyledons, the radicle being the real origin of the root. In *Limnanthemum* the radicle dies soon after the development of cotyledons, and the true roots rise at another point, viz. from the petiole of the long-stalked cotyledon. This is indeed highly singular, and I know of nothing analogous to this fact; but I am also as little aware of any analogy to the further vegetation of that genus. Another resemblance to *Trapa* lies in the formation of roots from the higher parts of the stem; or in *Limnanthemum* from the petioles which perform the function of a

* This rhizoma must be considered as the real caulis, and I cannot agree with M. A. de St. Hilaire (*Voyage au Bresil*, vol. ii. p. 413.) who takes for the stem that part of each petiole which is inferior to the inflorescence. This view is refuted by the younger plant.

stem. May not this analogy help to prove how erroneously some authors have considered those of *Trapa* to be stipules?

If we investigate more particularly the structure of *Limnanthemum*, a genus which adorns the waters of far the greater part of both hemispheres, we shall not without some interest inquire into the peculiarities of its organs. For my present purpose it seems sufficient to touch chiefly upon the structure of the seed in this genus, which certainly does not well correspond with the theory of its germination just proposed, or at least there are no characters in the seed by which the following phenomena may be foreseen. I am highly indebted to my friend Dr. Schleiden* for an examination of these parts; as he has been for years, and with the fullest success, occupied in investigating the development of ovula; and the acknowledged precision and admirable acuteness of his microscopical researches afford the following observations a greater weight than my own inquiries, if unassisted, could do.

The question whether the *Menyanthideæ* really belong to the *Gentianeæ* may be solved more easily if we compare the essential parts of their flowers before we are biassed by a view of their vegetative organs. The *Gentianeæ* have an ovarium composed of two carpels, which bear an indefinite number of ovules at their sutures. The genera with a *placenta centralis* make no exception to this rule, the latter being combined of four placentæ, whose vessels rise from the introflexed margins of the carpella in an earlier state. The seeds have only a single testa, are antitropous, and contain a small cylindrical embryo which lies in the middle of a fleshy albumen; the latter being formed in the interior of the *sacculus embryonis*, while the nucleus is obliterated. The cotyledons in that state are oblong and somewhat thickish (fig. 14—16), and between them may be observed a thin layer of albumen, so that Mr. Brown called the cotyledons of *Menyanthes* and *Gentiana lutea* "semi-discretæ." This structure of the seed is quite identical in the *Menyanthideæ* and in the other *Gentianeæ*; there is not the least trace of disproportion in the cotyledons of *Limnanthemum* while still in their seed, though the radicle be very slightly

* Dr. Schleiden's interesting paper on the development of the organization in Phænogamous plants will be found in Phil. Mag. for February 1838.

bent, which I did not see in any other plant of the family. But another difference is afforded by the testa of the ripened seed, which is covered by a thick and somewhat woolly epidermis in all *Menyanthideæ*, while the testa of the *Gentianeæ* is quite simple: the epidermis of the former is often muricated, a character which seems to be very constant, and may be employed for specific distinctions. If we consider that the *Menyanthideæ* are aquatic, many of them even floating plants, we may ascribe the presence of the epidermis of their seed to their habitat; for a similar one has not been observed in the *Gentianeæ*, nor can we consider this lobe a distinctive character, as it may disappear, when either one of the *Gentianeæ* is detected growing in water, or one of the *Menyanthideæ* on dry ground. Finally, the placentæ rise, in *Menyanthes trifoliata*, from the middle of the valves, which seems to result from an union of them with the interior surface of the endocarpium, and which occurs also in many *Gentianeæ*; the seeds are commonly much larger, but in *Frasera* they are equally large: in the latter genus their number is subdefinite, and in *Villarsia ovata* it is reduced, lastly, to a single seed on each side. Finally the induplicative æstivation of the corolla affords a good character for the *Menyanthideæ* as a peculiar group of the family, being *dextrorsum contorta* in all *Gentianeæ*; but the transition of these characters takes place in those *Gentianeæ* which have a plica between the lobes of the corolla, these plicæ having also an induplicate æstivation; and, as in *G. Andrewsii*, the lobes disappear wholly by abortion: the corolla by the plicæ remaining affords the same æstivation as in the *Menyanthideæ*. So far with regard to the differences of these groups in their reproductive organs, for I know of no more than these, and I find besides strong analogies, as for instance, in the direction of the unequal sepalum being remote from the axis (fig. 7.). As to what concerns the disparities of vegetation, these depend mostly on their aquatic or terrestrial station, viz., the development of a rhizoma, and accordingly of alternate leaves (which are repeated in *Swertia*), the development of long petioles, so that the leaf may arrive at the surface of the water, and the verticillæ of leaves in *Menyanthes trifoliata* being remote from its stem for the same purpose, &c. I think an accurate examination of all these

points may be decisive for bringing the *Menyanthideæ* and its congeners into a distinct tribe, but for retaining them in the same family.

The regularity of the embryo of *Limnanthemum lacunosum* may be esteemed a strong argument against the correctness of my theory of its germination ; and though it is not decisive I was much disposed to believe my views erroneous, and to consider the body inclosed by the seed, either as consisting of both cotyledons (in which case the germination would be analogous, e. g. to that of *Tropæolum*), or as having lost already one cotyledon by mutilation ; but as both cases would have been made out by examination, and the analysis, so far as it depends on the materials, was against them, I could not but recur to my former opinion. Therefore I leave the matter, as it stands now, to those who may examine living specimens ; and until their decision the point may be deemed doubtful. I have still to add a few words on the reasons by which I was induced to propose a new nomenclature for these plants.

After the discovery of *Villarsia Cristagalli* and some Indian *Limnanthema*, it seemed impossible to retain the old genera *Menyanthes* and *Villarsia*, as distinguished by the appendices of their corolla. I followed an observation of Mr. Brown, that the floating species have a nondehiscent fruit ; when I proposed, according to their habit, to adopt three genera, one irregularly dehiscent, with the seeds affixed to the middle of the valves (*Menyanthes*), another with a capsule at the same time localicidal and septicidal, and the seeds hanging to the margins of the valves (*Villarsia*) ; and a third, comprehending all floating species with an indehiscent fruit, and the seeds affixed as in *Villarsia* (*Limnanthemum*, Gmel.). The species of the latter genus have hitherto not been correctly distinguished, though some of them have lately been well defined by Sir W. J. Hooker, and Dr. Wight. I observe that there are many variations as to the largeness and surface of the leaves according to their age which are not to be applied as specific distinctions. Generally the leaves are, in the first instance, smooth, then appear glands on the inferior surface, these are obliterated and more or less roughness remains ; sometimes the glands are to be seen in the bottom of small circular processes, from which appear-

ance the name *lacunosum* seems to have originated. But characters which are not subject, so far as I know, to any observation, are afforded by the *appendices corollæ*, by their colour, by the form and length of the style, and by the surface of the seeds.

DR. GRISEBACH.

Berlin, March, 1837.

III.—*Contributions to the Natural History of Ireland.* By WILLIAM THOMPSON, Esq., Vice-President of the Belfast Natural History Society.

No. 5.—*On the Birds of the Order Insectores*.*

[Continued from Magazine of Zoology and Botany, ii. p. 440.]

THE REDBREAST—*Sylvia Rubecula*, Lath.—Is very common in Ireland. Well known as are its habits, a few notes illustrative of them in the neighbourhood of Belfast may be selected: and first, with regard to its familiarity. In the very mild winter of 1831—32 a redbreast very frequently joined a friend and his lady residing in the country at breakfast, and without invitation, eat of the bread and butter on the table, and when not so employed, made itself quite at home by perching on the toasting-fork at the fire. In summer it built in one of the out-houses, and visited the kitchen daily; its song was in August, poured forth in the hall. In this house also a redbreast once built its nest in the fold of a bed-curtain in an occupied chamber: such a proximity being held undesirable, the room window was closed against the intruder, and in consequence the first egg was laid outside on the bare window-sill. This circumstance caused pity for the bird, and the egg was placed in the nest, where the usual number was duly deposited and incubated. One young bird only was produced, which was overfed to such a degree that it grew to a

* The order in which the species appear in Mr. Jenyns's 'Manual of the British Vertebrata' is followed in these papers. In the MS. of the first of the series on the *Raptores*, one, two, or three synonyms were given to each species, with the view that some one of them might be known to every reader. The editors however considered one scientific appellation sufficient in every instance; and being thus limited I adopt that used by Temminck as the most widely known, although I am partial to a much greater subdivision of genera than appears in his 'Manual.'

most unnatural size, but did not long survive, falling a victim most probably to too good living. Butter is so great a dainty to these birds, that in a friend's house frequented during the winter by one or two of them, the servant was obliged to be very careful in keeping covered what was in her charge to save it from destruction: if unprotected it was certain to be discovered. I have notes of their visiting labourers at their breakfast hour and eating butter out of their hands, and entering a lantern to feast on the candle. But even further than this, I have seen the redbreast exhibit its partiality for scraps of fat, &c. Being present a few days ago (December 1837) when the golden eagle described at page 45 of vol. ii. of the Magazine of Zool. and Bot. was fed, to my surprise one of these birds took the eagle's place on the perch the moment he descended from it to the ground to eat the food given him, and when there it picked off some little fragments; and this done, quite unconcernedly alighted on the chain by which he was fastened. I at the same time learned that it thus regularly visited the eagle's abode at feeding-time, and as yet there has not been any severity of weather. A plant of the *Fuchsia tenella* in the "Falls" greenhouse was entirely deprived of its seed by these birds.

Except at the moulting period the song of the redbreast is heard with us throughout the year, and in the grey morning as well as the dusk of the autumnal and winter afternoon; by moonlight it was once heard by an ornithological friend at the last-named locality. I have more than once listened to the commencement of its song in the first week of June at a quarter before three o'clock. In fine autumnal mornings succeeding wet nights, the favourite time for the harmony of this and many other birds, I have seen and heard about a dozen of redbreasts singing at once, when perched at pretty regular distances, twenty-five to thirty yards apart. So many of them sending forth their notes at one time—without reference to plumage, which sufficiently marks the adult from the immature—satisfies me that the young birds of the year bear their part in the concert, and the fact of every individual in view trilling forth its notes, favours the idea that the female bird also is possessed of song.

That a single bird or pair of redbreasts have generally a particular beat or range I have had abundant evidence, (vide Dovaston in *Mag. Nat. Hist.* vol. vi. p. 3,) as also that they very frequently keep within it as spring advances, instead of retiring to the thickest woods to nestle as described by many authors. Within towns they have been known to me as frequenting a certain quarter throughout the year. For two seasons this occurred in our own office-houses at Belfast, and in both two broods were reared. In one instance the nest was placed on the top of a wall supporting the roof of the gateway, and in the other on the same part of the side-wall of a three-story building, their only approach to it being through small apertures, about two inches in diameter, that were cut in trap-doors on the first and second floors to admit the rope attached to a pulley. Perched on the neighbouring buildings these birds gave forth their song, and for about the latter half of the month of October 1831, when the days were very fine and bright, one regularly frequented the stable, and sang when perched upon the stalls without being in any degree disturbed by the general business of the place going forward, even within two or three feet of his station.

A pair of redbreasts that were assiduously watched during their nidification in the conservatory attached to the town-house of an acquaintance, were one morning found in great consternation, produced, as it turned out, by the nest having been taken possession of by a bat, which they eventually compelled to change his quarters.

Four particularly noted instances of the redbreast building within doors near Belfast in the summer of 1833 here follow. In all of them (and the country house already alluded to may be added) shrubberies and plantations are quite near to the chosen sites. The two first were communicated by my relative, (noticed in one of my former papers on birds,) and occurred at Wolfhill. He observes: "The nests of a robin that I examined in the carpenter's loft are placed on the corner of the wall which supports the roof; the foundation is large wood shavings, of which the sides of the nest are likewise formed, together with moss, beech leaves, wool, tufts of cow-hair, &c., but with horse-hair only are they lined. The mass of materials in which these two nests

are made is about a foot and a half in length, eight inches in breadth, and five inches in thickness. In wet days the male bird kept much within the loft and sang there. The carpenter tells me that one only flew in with the leaves and collected the shavings; this individual he knew from its wanting the tail: it made very free with his pot of grease, and picked from it while in his hand. On another occasion the nest was built in the joist-hole of a wall, in the process of completing which it was necessary to remove it, when it was placed in an adjoining aperture of the same kind. The parent bird after looking for some time about the spot where the nest had been, rejoined her young—of which one was killed by falling out of its domicile in the course of removal—in their new situation; and here she did not remain undisturbed, as in the breaking out of a door within a foot of the nest the mortar and stones fell perilously near her, but she nevertheless deserted not her young.” At Fort William, the seat of a relative, the following occurred. In a pantry, the window of which was kept open during the day, one of these birds constructed its nest early in the summer. The place selected was the corner of a moderately high shelf among bottles, which being four-sided gave the nest the singular appearance exteriorly of a perfect square. It was made of moss, and lined with a little black hair, and on the side that was exposed to view, and that only, were dead beech leaves. When any article near the nest was sought for, the bird, instead of flying out of the window as might be expected, alighted on the floor, and there patiently waited until the cause of disturbance was over, and then immediately returned to its nest again. Here five eggs were laid, which, after being incubated for the long period of about five weeks without any success, were forsaken. The room above this pantry was occupied as a bird-stuffing apartment; and after the redbreast had deserted the lower story, a bird of this species, and doubtless the same individual, visited it daily, and was as often expelled in the fear that the specimens might in consequence be injured. Finding that expulsion was of no avail, recourse was had to a novel and rather comical expedient. My friend had a short time before received a collection of stuffed Asiatic quadrupeds, and of these he selected the most fierce-looking Car-

nivora, and placed them at the open window, which they nearly filled up, hoping that their formidable aspect might deter the bird from future ingress ; but the redbreast was not to be so frightened "from its propriety," and made its *entrée* as usual. Its perseverance was at length rewarded by a free permission to have its own way, when, as if in defiance of the *ruse* that had been attempted to be practised upon it, the chosen place for the nest was the head of a shark, (the mouth being gagged may have prevented its being selected,) which was hanging on the wall, the tail of an "alligator stuff'd" serving to screen it from observation. During the operation of forming this nest the redbreast did not in the least regard the presence of my friend, but both worked away within a few feet of each other. On the 1st of June I saw it seated on the eggs, which were five in number : they were all productive, and the whole brood in due time escaped in safety.

That the noisy operations of the ship-builder will not prevent the selection of a place in his immediate vicinity for nidification, is shown by a circumstance which came under my own observation. On May 13, 1836, I saw a redbreast's nest containing young in a hole apparently where a knot had been in one of the timbers of the "Dunlop," then under repair in the dry-dock at Belfast. It was built inside the vessel about three yards from the top of the timber, (the deck was off,) and at the time of its construction, as at present, the deafening process of driving in the *tree-nails* was carried forward, and occasionally so close to the nest.

An observant friend discovering a redbreast's nest in which the bird was seated, remarked its apparent stupidity, and having lifted it off the eggs and laid it on his open hand, it sought not, and indeed seemed to want the power, to escape. He placed it in the nest again, and returning the next day found the young brood out. The appearance of the bird on the previous day it was now presumed had been caused by its extreme intentness on the last stage of incubation.

But in such an instance as the following, any notice of the well-known pugnacity of the redbreast would be supererogatory. On one occasion I saw two of these birds fighting most wickedly in the air, and then alighting to take breath, which,

when they had a little recovered, and were again within a foot of each other ready to recommence the charge, a duck that had witnessed the combat quickly waddled up, and in the most gentle and pacific manner shoved with its bill the one to the right further in that direction, and the one to the left further so, thus evidently separating them to prevent a renewal of the conflict.

In snares set for small birds during frost, I have remarked that redbreasts were generally the first victims. Their extreme tameness before a fall of snow wherever we meet with them unerringly shows their sensibility to the coming change, and has in several instances led me to prognosticate it, and always with certainty, when no other indication was perceptible.

BLACK REDTAIL, *Sylvia Tithys*, Scop.—The redstart noticed by me in the Zoological Proceedings for 1834 (p. 30.) as the *Phenicura ruticilla*, on the authority of Robert Ball, Esq., has since been proved by that gentleman to be the rare British species *S. Tithys*. I am likewise informed that in the autumn of 1818 or 1819 he shot five individuals of this species at Youghal, county Cork, but of which, unfortunately, all that remains is one ill-preserved specimen. A redstart was subsequently taken in a corn-store at Youghal, and in June 1837 another was seen in a garden within the town; but whether these also were the *S. Tithys* cannot now be determined.

In the counties of Dublin and Armagh I have heard of the redstart's occurrence, but have been unable to learn anything satisfactory on the subject.

It appears somewhat strange that the common species *P. ruticilla* should not be a regular summer visitant to any part of Ireland, for in no country are their localities apparently better suited to it: of these I judge from the haunts in which it has occurred to me in Westmoreland and Derbyshire, and those in which I very frequently met either with it, or some of the closely allied *Phenicuræ* (Swainson) in Switzerland.

GRASSHOPPER WARBLER, *Sylvia Locustella*, Lath.—Montagu states that he has found this bird in Ireland (Orn. Dict.), and Templeton remarks that it is "not very uncommon
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during spring and summer," (Mag. Nat. Hist., vol. i. p. 405, New Series,) which observation I know, from having access to his MS., applies to the neighbourhood of Belfast. Here there is not an Irish-killed specimen of the bird preserved, owing perhaps as much to the gun not being used during the time of its sojourn in this country as to the difficulty of procuring individuals; nor have I anywhere had the opportunity of examining a native specimen. By several ornithological friends as well as myself, a warbler has in the north occasionally been seen, and more frequently heard, whose note agrees with the peculiar one of this species. About Killaloe, county Clare, the Rev. Thomas Knox has partially seen and has heard a bird the note and habits of which correspond with those of the grasshopper warbler, but a specimen of it has not been obtained by him.

THE SEDGE WARBLER, *Sylvia Phragmitis*, Bechst.,—Is a regular summer visitant to Ireland. It is generally observed around Belfast within the first ten days of May, but in 1836 one was seen on the 16th of April. The 5th of September is the latest date on which I am aware of its being noticed, but further observation may possibly show that it remains until a later period, as it does in England. (Selby's Ill. Brit. Orn., vol. i. p. 202.) The migration of the sedge warbler extends to the extreme north-west of Ireland, where on July 1, 1832, I heard and saw one near Dunfanaghy; and Mr. Stewart, in his Catalogue of the Birds, &c. of Donegal, observes that it is common. Throughout the northern counties generally it has occurred to me in suitable localities; these are not confined to where "reeds and other tall aquatic plants" abound, or even grow, as is generally described, but it is found in the lower grounds about old ditches, on which the sloe or blackthorn (*Prunus spinosa*) and other shrubby plants afford it a safe asylum; also on the banks of mountain rivulets at as great an elevation as the spontaneous growth of the willow or any underwood forms sufficient shelter; and it likewise frequents the wooded borders of well-kept ponds, where none of the aquatic plants alluded to appear.

It is perhaps too common-place to be remarked here, that it is simply from natural inclination and not from shyness that

the sedge warbler inhabits the "tangled brake." When perched singing on a reed it has admitted my approach within about three paces without ceasing its song; and what might perhaps be termed its boldness, is evinced by any object flung into its haunt prompting it to sing, as if in defiance of the interruption, or, as a certain author would imagine, "to keep *its* courage up." The well-known and most amusing song of this species is sometimes heard from its arrival until the end of July.

A bird described to me by the Rev. T. Knox as frequenting the county of Westmeath and the vicinity of the river Shannon, is I have little doubt the sedge warbler.

BLACKCAP WARBLER, *Sylvia Atricapilla*, Lath.—Mr. Templeton remarks that the blackcap was seen at Crannmore, his residence, near Belfast, on the 17th of June 1818, and twice since that time. A male bird shot near Dublin in the first week of December 1833, was forwarded to my friend Robert Ball, Esq., before the vital heat had fled. On March 1, 1834, I saw a recent specimen of this bird, an adult male, which was brought to be set up at a bird-preserver's in Belfast by the Bishop of Down, in whose garden, within a few miles of the town, it had been shot either on that or the preceding day. Mr. Robert Davis, jun., of Clonmel, county Tipperary, informs me that in his collection there is one which was killed in that neighbourhood on Dec. 27, 1834, and which was stated by the person who shot it to have been accompanied by five or six others. By Mr. W. S. Hall, bird-preserver, Dublin, a specimen was shown me which was killed at the Vale of Avoca, county Wicklow, on May 23, 1837, and a few more were seen at the same time.

The blackcap does not, so far as I can learn, appear annually in any part of Ireland. A drawing taken a few years ago from a bird so rare in one of the most southern counties as to be unknown to a scientific collector, was submitted for my opinion, and represented a female* of this species. It is sin-

* Judging from Temminck's description in the 1st part of his 'Manuel': in the 3rd part, since published, he adds, that the young males resemble the female, the red colour of the top of the head being only less decided.

gular, that of the occurrence of the blackcap on the few occasions here mentioned, it must in three instances be presumed to have wintered in Ireland, and further, that such should have been in the north, the centre (as to latitude), and the south. Being one of the latest summer birds appearing in England, it may I think be fairly concluded that the occurrence of an individual on the 1st of March is rather indicative of a winter residence than of an unprecedentedly early vernal migration.

The bird described in Rutton's Natural History of the County of Dublin, vol. i. p. 317, as the "Blackcap," is obviously not the *Sylvia atricapilla*.

GREATER PETTYCHAPS, *Sylvia hortensis*, Lath.—The following observations on this species are copied from the MS. of the late John Templeton, Esq.: "On the 21st of May 1820, I had the pleasure of seeing this bird, to whose haunt in my garden I was attracted by its pleasing melody. * * It was not very shy, coming near enough to be distinctly seen, but was extremely restless, flitting every moment from place to place, and only stationary on the branch while it gave out its song. * * The male continued to sing until the young were reared, when his song ceased for about a fortnight; then it was again renewed, as I suppose on the construction of a second nest."

THE WHITETHROAT, *Sylvia cinerea*, Lath.,—Is a regular summer visitant throughout Ireland. Like the sedge warbler it appears about Belfast early in May, and has been reported to me by Mr. James Garrett of Cromac, near this town, as observed on the 24th of April* 1836: by the same gentleman also one was seen on the 15th of September last, the latest date on which I am aware of its having been remarked here. This bird is well known in Ireland. Mr. Stewart observes that in Donegal it is "common," a term that may be generally applied to it in the north.

In communications with which I have been favoured, it is stated by the Rev. T. Knox to have been obtained by him at

* On the 21st of this month it was once heard near Carrickfergus. M'Skimmin's Carrickfergus, p. 354, 2nd ed.

Killaloe; by Mr. Robert Davis, jun., to be not uncommon about Clonmel; and by Mr. T. F. Neligan, to be a regular summer migrant to the county of Kerry.

Its song commences on arrival, and generally ceases early in the month of July. From its habits, and the grotesquely earnest appearance that the erected feathers on the crown of its head and the distended throat impart when singing, it is one of the most interesting of our warblers. When on one of its harmonious flights, the whitethroat, though generally so, is not always constant to returning to the same place again. I have seen it rise from a low bush, and singing in its upward and irregular flight, alight on a leafless tree at some little distance, and there continue to pour forth its notes without intermission, or as if it had been perched in one place all the time. Under the date of June 4, 1833, a note appears in my journal that two accurately judging friends had several times of late heard the whitethroat imitate the songs of other birds much after the manner of the sedge warbler.

Early in July, 1837, a nest was discovered at the "Falls," within about ten paces of a public highway, and double this distance from an occupied dwelling-house. It was elevated about a foot above the ground, in a sloe-bush, and concealed by the growing grass of a late meadow: at this late period it contained eggs. Again, on July 11, 1833, when walking at the side of the river Bann, near Coleraine, a whitethroat, perched upon a hedge, and with a caterpillar in its bill, denoting the vicinity of its nestlings, permitted my approach within about two paces, all the time keeping a great uproar, which was a mere repetition of the word *churr*. This species seems partial to placing its nest in thorny plants; thus in the latter instance it was at the base of a whitethorn hedge, in the former in a sloe. In brambles it most commonly occurs here, and occasionally in the wild rose: grasses generally serve to screen it from observation*.

* *Sylvia Curruca*, Lath. In a note added by the late Mr. Templeton to a copy of Dr. Patrick Brown's "Catalogue of the Birds of Ireland," published in Exshaw's Magazine for 1772, I find,—"*Motacilla Curruca*, White-bellied Nightingale, seen about Ballydangan in May 1773, Brown." In the Catalogue the *Mot. Sylvia*, or *Syl. cinereu*, appears. Several of my

WOOD WREN? *Sylvia sibilatrix*? Bechst.—Relying on the accuracy of a relative, who has bestowed much attention on birds and their nests, I should be disposed to give this species a place here with confidence but for one character, hereafter to be mentioned. On June 19, 1832, it is remarked of a nest he detected on the ground in a small meadow surrounded by a wooded glen, near Belfast, that it belonged to a bird most nearly approaching the willow wren, *S. Trochilus*, but larger, and with a whiter breast; and that the eggs, instead of being marked with numerous very minute, and a few large specks of a dark pink colour, like those of the *S. Trochilus*, were dotted all over, so much so as to give the egg, at a cursory view, a light brown appearance. Sketches of these eggs and of those of the willow wren, made at the time, are now before me, and present the difference here pointed out. He observes that it was a very pretty nest, formed of moss, and lined with feathers*. On the morning of the 19th of June it contained one egg, on the 21st three, and on the 24th five eggs; on July 7th the young were hatched, and on the 19th had left the nest: thus in six days the complement of eggs was laid, in thirteen they were incubated, and in eleven or twelve days the young were fledged. There was a second nest at the same place (Wolfhill) this season, containing similar eggs.

The *S. sibilatrix* is not recorded as Irish.

THE WILLOW WREN, *Sylvia Trochilus*, Lath.,—Is a regular summer visitant to Ireland, and is commonly dispersed in suitable localities throughout the country. The remark has been made by Montagu, that “it is frequently found with the wood wren, but does not extend so far to the west in England, as it is rarely met with in Cornwall.” But if there be thus a diminution of numbers to the west in England, the circumstance must, I presume, arise from some other cause than geographical position. In Ireland the wil-

correspondents residing in the more southern portion of the country are disposed to consider the *S. Curruca* one of the regular summer birds of passage.

* This is the only character against its being that of the *S. sibilatrix*, whose nest is stated by authors to differ from that of the *S. Trochilus* in not being lined with feathers.

low wren ranges equally to the counties jutting out to the extreme south-west and north-west of the island, being common both to Kerry and to Donegal*.

In the neighbourhood of Belfast this species generally appears about the middle of April, when its presence is at once proclaimed by its song. In the years 1833 and 1834 it arrived within the first week of this month, but in the backward spring of 1837 was later than ordinary. It is commonly seen until the middle of September. On the 24th of this month, and on the 10th of October 1832, I heard it sing; on the former occasion incessantly for about half an hour, or so long as I gave attention. From the period of its arrival until the moult commences, the song of the willow wren is constantly heard; and as soon as the moulting is over, is recommenced, often in a weaker tone, and continued during fine weather until the very time of its departure.

My friend at Cromac, who has had many nests of the willow wren, describes them all to have been composed of fine hay,—hence the name of “hay-bird” in some parts of England,—and lined with feathers. They were situated on the ground at the foot of trees, except in one instance, when the nest was placed in the open meadow, several yards distant from the hedge; there was usually a long approach to them through the brake. Towards the end of August I was once amused on perceiving several willow wrens rising into the air from some pea-rods in a garden, after the manner of the spotted flycatcher when on its aerial captures, and thus two of them were occasionally occupied at the same time. A few flycatchers (*Muscicapa grisola*) were also on the pea-rods, from which they now and then sallied after their winged prey, having thus apparently prompted the *S. Trochilus* to these flights.

In the north of Ireland this species frequents plantations, from those of the town-square to the most elevated on the mountains. Although from the circumstance of its general

* In Mr. Stewart's Catalogue it is set down as “common” in Donegal, and so have I met with it there. By Mr. T. F. Neligan, of Tralee, it is stated to be very common in Kerry.

occurrence in pleasure-grounds and gardens (these it frequents in the town of Belfast) the name of "willow wren" may be thought "unmeaning," (vide note to White's Selborne, p. 84, ed. 1837,) I cannot so consider it. This name was doubtless bestowed upon the bird originally on account of its partiality to willows. This I have particularly remarked, on which occasions the twigs and branches of the common osier, *Salix viminalis*, abounding with aphides, were its chief favourite. Never have I seen these birds so numerous anywhere,—and I include several continental countries, in addition to the British Islands,—as they were annually in a certain hedge row of these trees in the neighbourhood of Belfast. On some scattered trees of the *Salix Smithiana*, in the same locality they were for a similar reason almost equally plentiful.

A young willow wren that was caught at the "Falls" last summer soon after it had left the nest, became at once, from its familiarity, very attractive. When at liberty in a room, and called by the name of "*Sylvia*," it immediately flew to and alighted on a finger held out for the purpose. So partial was it to this unnatural perch, that, like a hooded hawk upon the "fist," it there remained stationary when carried out of doors to feed upon the aphides infesting some monthly roses near the house, and when so engaged it flew not to the plant, but rested by choice upon the finger. To the exceeding grief of its owners it soon died, in consequence of too frequent washing.

In my possession is a specimen of the *S. Trochilus*, which flew on board a ship in 1834, to the north-west of the Azores, in latitude 44° N. and longitude 34° W.; the date, unfortunately, was not communicated.

THE CHIFF-CHAFF, *Sylvia Hippolais*, Lath.,—Is a regular visitant to certain localities in the north of Ireland, and also, as I am informed by Robert Ball, Esq., to the vicinity of Dublin. In the first week of April its notes are generally heard about Belfast; but in the spring of 1837 they did not attract attention until some time after this period. In the middle of May I have been for the greater part of a day in Colin Glen, the great resort of the species in this neighbourhood, without

once hearing its notes, though during a similar time, a month before, they were almost constantly uttered, and when the days alluded to were equally fine. A certain progress of their broods may have caused this silence. The chief haunts of the chiff-chaff in the counties of Down and Antrim are wooded glens and extensive plantations, especially where there is cover from underwood, though it generally frequents the higher trees: hedge-rows too are occasionally visited.

As a difference of opinion exists about this bird, (vide note to White's *Selborne*, pp. 80 *et seq.*, ed. 1837) I had intended entering pretty fully into the subject; but turning to the description of the species in the 'Manual of the British Vertebrata,' p. 112, I find it to accord so well with my specimens,—which, from being shot in the month of April, when uttering their notes, may be considered adults,—as to render further observation unnecessary.

The terms *Syl. Hippolais*, Lath., and chiff-chaff have been correctly used as synonymous in the best British works. The original description in the 'Index Ornithologicus' (vol. ii. p. 507.) in a few words marks the species; Temminck however, in his valuable 'Manuel' of the Birds of Europe, (part i. p. 222.) has adopted Latham's name for a continental *Sylvia* very different from the one to which it was applied by this author.

GOLD-CRESTED REGULUS, *Sylvia Regulus*, Lath.—This small and beautiful bird is common, and resident in plantations throughout Ireland. In the north its song is occasionally commenced in the month of February, and has been heard at the end of September. In the nuptial season the male erects his crest so as to make his whole head appear a blaze. My friend at Cromac on one occasion, when attending to the process of nidification adopted by a chaffinch that built within view of his window, discovered that he was not the only spectator, a regulus at some little distance (and, as it afterwards proved, with sinister intent,) being recognised as a looker-on. When the chaffinch took flight from the nest, this bird, in the most cunning manner, stole round to it in an opposite direction and carried off part of the materials. This

was its constant practice, as, in at least a dozen instances it was so observed; but the chaffinch eventually discovering the regulus in the act, gave it a severe chase through the plantation, and its mal-practices were never afterwards known to be repeated. Of two nests of which I have notes, neither was domed; one was neatly fixed to the branch of a silver fir, whose foliage shaded its little opening of one inch diameter; and the other was placed in a laurustinus, the larger leaves of which afforded more efficient protection.

Soon after the young can provide for themselves, they and their parents flit about in company, and ring their little changes throughout every plantation. In the first autumn that they thus came under my observation, I, from hearing them simultaneously everywhere around Belfast, was rather disposed to believe in a migration from the north, (vide Selby's Ill. Brit. Orn., vol. i. p. 230, 2nd ed.,) but having subsequently heard them in different years so early as the month of August, I now consider that it is our indigenous birds alone that by constantly uttering their little cries thus attract attention.

The gold-crested regulus seems not to me the hardy bird that authors generally imagine. In the north of Ireland it has been frequently found dead in severe weather, and even after slight frosts*. Early in the winter of 1835 a friend brought me three of these birds, that had been captured by a cat in a small garden, in a very populous part of Belfast, and on the preceding day four or five had in the same place shared a similar fate.

Of three stomachs of the regulus which have come under my inspection in the months of December and January, two were entirely filled with insects, among which some Coleoptera were apparent; and the third contained, in addition to fragments of stone, only seeds, of which there were two or three kinds.

[To be continued.]

* In a note to White's Selborne (p. 180, ed. 1837), Mr. Herbert gives instances of the fatal effect of cold on caged individuals.

IV.—*On some new Species of Quadrupeds and Shells.* By
JOHN EDWARD GRAY.

THE British Museum has lately purchased some very interesting skins of Quadrupeds from Sierra Leone, among which are the following new species.

Antelope Zebra, Gray. Back bright fulvous fawn with broad glossy black transverse stripes, beneath pale fulvous; outer side of legs grey-brown, darker beneath.—This is evidently the animal described by my late friend E. T. Bennett in the Proc. Comm. Science Zool. Soc., vol. ii. p. 123, from a very imperfect skin: the one now in the Museum has the tail complete, and shows that he was quite correct in thinking that it was probably an antelope, and it is certainly the most brilliant of that beautiful genus. His specimen was said to come from Algoa Bay, but this is probably a mistake, as that in the Museum was sent direct from Sierra Leone.

Felis neglecta, Gray. Fur very short, brownish grey, with small close blackish spots; smaller, more elongated, and closer together down the rather darker dorsal line; sides rather paler; throat, belly, and inside of limbs white with larger black spots and stripes; nape darker, with close narrow rather darker lines; outer side of legs and feet brownish grey not spotted; tail rather slender, about half the length of the body, grey-brown with a darker central line and varied darker on the sides. Length of body, 3 feet; tail, 15 inches.—*Hab.* Sierra Leone.

Unfortunately we have only an imperfect skin, wanting the face and claws, of this highly interesting animal, which must be as large as a small leopard. Among the skins received there is one also of another cat, very like the common domestic cat in appearance, but so regularly and peculiarly marked, as to make me inclined to believe it to be a distinct species, or a very decided variety.

I will here describe some new Shells from the same country.

Apporrhais Senegalensis, Gray. Shell regular, spirally striated; the upper whorls with one central, and the last with two subcentral, series of small nodules, with a series of much smaller tubercles in front of them; outer lip, with two acute expanded lobes. Axis 13^m.—Sierra Leone. My cabinet.

Fusus elegans, Gray. Shell fusiform, white; whorls nine,

ventricose, rounded, with rather distant, acute, raised, narrow, brown topped spiral ridges, and regular broad rounded plaits; canal subcylindrical, rather shorter than the spire; inner lip rather raised with a few slight plaits, outer lip crenated; throat grooved. Axis 2".—Sierra Leone. Brit. Mus. and my cabinet.

Fusus niveus, Gray. Shell ovate, fusiform, regularly and closely spirally grooved; spire conical; whorls with a sub-posterior series of nodules and shelving to the suture; apex small, subcylindrical, blunt; canal short, rather oblique, inner lip rather thickened, smooth; throat grooved. Axis 15".—Sierra Leone. My cabinet.

Nassa vitrea, Gray. Shell ovate, turreted, transparent, with distant spiral striæ; whorls with equidistant nodulose varices, and a subanterior brown spiral band; outer lip thickened, white, with a brown spot in front. Axis 5".—Sierra Leone. Brit. Mus. and my cabinet.

Cardium læve, Gray. Shell ovate-cordate, ventricose, pale brown, reddish spotted, smooth, with thirty to thirty-one very indistinct flat radiating ribs; lozenge smooth ovate-lanceolate. Very like *Cardium lævigatum*, but more ventricose.—Sierra Leone. Brit. Mus.

Turbinella spinosa, Gray. Shell fusiform, white, covered with a smooth brown periostracum; whorls 7, upper ones with a series of conical tubercles, the last with distinct spiral ridges and a subposterior series of conical spires; canal subcylindrical with the mouth about as long as the spire; throat ridged; pillar with three very slight plaits. Axis 15".—Sierra Leone. My cabinet.

Drillia, Gray. (Pleurotomina.) Shell turreted; mouth oval, linear; inner lip thickened, outer lip inflexed, thickened behind, with a deep thick-edged posterior sinus, and a small sinus in front, just before the short rather recurved canal.

Drillia umbilicata, Gray. Shell white, closely and spirally striated; spire acute, half as long again as the mouth; whorls slightly raised, with a series of transverse compressed tubercles, the last with 6 or 7 larger tubercles; axis umbilicated; lips sharp-edged; mouth reddish white. Axis 15".—Sierra Leone. Brit. Mus. and my cabinet.

Drillia clathrata, Gray. Shell dark brown, closely and spi-

rally ridged and concentrically plaited; axis slightly perforated; outer lip strongly thickened behind; canal short. Axis 1^m8.
—*Hab.* ——— ? My cabinet.

Drillia bicolor, Gray. Shell black, spirally striated, with a subposterior series of angular tubercles crossed with a yellow spiral band; inner lip thickened; mouth slate colour. Axis 1^m.
—*Hab.* ——— ? My cabinet.

Drillia suturalis, Gray. Shell yellowish white, closely spirally striated; whorls with a posterior groove near the suture, the upper whorls slightly nodulose; outer lip thickened behind; canal rather elongate, scarcely recurved.—*Hab.* ——— ? My cabinet.

DEMOULIA, Gray, n.g. (*Buccinidae*). Shell ovate, subglobose, covered with a downy periostracum; spire short, conical; apex papillary; whorls compressed; mouth ovate; inner lip thickened, with a ridge behind, outer lip contracted, thicker externally, not variced, strongly plaited internally; canal short, sharply recurved.—Intermediate between *Nassa* and *Dolium*, but differs from both in being covered with a velvety periostracum, in having no distinct varices, in the large size of the spire, and in the contraction of the mouth.

Demoulia pulchra, Gray. Pale reddish, covered with a brown periostracum, slightly spirally striated; outer lip white, inner lip smooth; spire short; upper whorls rounded; suture deep. Axis 10^m.—Sierra Leone. My cabinet.

Buccinum retusum, Lam. Encyc. Mét. n. 24. t. 394. f. 3, and perhaps the fossil *Buccinum Pupa* and *B. glabratum*, should be referred to this genus; the latter has the inner lip strongly toothed or plaited, which unites it to *Nassa*.

Pleurotoma tenuis, Gray. Shell fusiform, thin, pale, brownish, pellucid; whorls with a broad smooth posterior sutural concave band, convex in front, and marked with arched transverse ridges; canal tapering; mouth and canal nearly as long as the spire; axis with a linear perforation in front. Axis 2^m.—Sierra Leone. My cabinet.

*Macra Sauliana**, Gray. Shell ovate-elongate, compressed,

* I have named this species in honour of Miss Saul of Poplar, a most industrious and liberal collector of shells, to whom I am indebted for this species.

thin, pellucid, pale, with whitish rays and darker submarginal streaks; covered with a thin pale brown laminar periostracum; lunule and lozenge smooth, keeled; lateral teeth very thin.—*Hab.* China.

Very like *M. Helvacea*, but smaller and much more compressed.

V.—*Prodromus of a Monograph of the Radiata and Echinodermata.* By LOUIS AGASSIZ, D.M.*

HAVING had occasion for some years to examine a great number of Echinodermata, and having paid particular attention to their general organization, but more especially to the solid portions of their integument, which have been hitherto considered the most important of their external characteristics, I have felt induced by these circumstances, and others no less favourable to inquiries of this kind, to publish the following outline of a survey of the genera of this class as an introduction to a more general and critical work, in which I purpose hereafter to treat of all the species and their comparative anatomy.

The section of radiated animals to which the Echinodermata belong, should, in order to be characterised in a general manner, be reduced to three classes: the Polypi, the Acalephæ, and the Echinodermata. Intestinal worms, and a great part, if not the whole, of the Infusoria should be restored to the section of articulated animals. That I may not be compelled for a moment to lose sight of the main object of this paper, I think it advisable, as M. de Blainville has already proposed some of these changes, to refer for information as to the limitation of these classes to the article "Zoophytes" in the 'Dictionnaire des Sciences Naturelles,' though there are several points of detail on which he and I disagree.

The class of the Echinodermata confined within its natural limits should contain no more than the three genera *Holothuria*, *Echinus*, and *Asterias* of Linnæus, which have become the

* Translated from the extract in the 'Annales des Sciences Naturelles,' Mai 1837, taken from the 'Mémoires de la Société des Sciences Naturelles de Neuchâtel,' tome i.

types of as many families. It is therefore necessary to exclude from it the *Sipunculi*, &c., which constitute the second order of this class in the Animal Kingdom of Cuvier, and to place them amongst the Vermes. Thus reduced the class is characterised especially by the presence of retractile pedicles arranged in rows between the vertical segments of the integument of the body. On account of this peculiarity M. de Blainville has changed the name of Echinodermata, which is not really applicable to the *Holothuria*, into that of Cirrherodermata, although the nature and functions of these moveable organs, as well as their relations to the external integument, are too imperfectly known at present to justify him fully in giving them that name. The name of Radiated, borrowed from Lamarck, and restricted to the limits which science now assigns to this class, seems therefore entitled to a preference. It has the advantage of being simple, and that of involving no systematic idea.

The most general character commonly assigned to the Echinodermata is that all the parts of their bodies are disposed like radii about a common centre. This character they possess in common with the whole division of radiated animals. However, on closely examining this radiated disposition of the parts, it is observable that in different genera the rays are not always alike, and do not always tend to a centre of the same nature. My first care has been therefore to discover the general laws of configuration and organization in this class, and to determine the analogies which the different regions of the body bear to one another and to those of other animals, in order thus to obtain an appropriate terminology for their description. The regular radiated disposition of the parts in most of the Radiata renders it difficult to fix such a terminology. I thought it best therefore to begin with the study of the forms most remote from the star type, (in which an anterior and posterior, a superior and inferior, and consequently a right and a left region are naturally exhibited,) in order, if possible, by easy gradations to trace the same relations in the most regular and even in the spherical and star forms. If, for instance, we examine the disposition of the parts in the *Spatangi*, we see at once that the form of their body, more or less elongated, is a consequence of the mouth and the anus being placed towards

the two extremities, and that besides four ambulacral and four interambulacral series symmetrically placed in pairs on each side of a plain, which, if continued from the mouth to the anus, would divide the animal into two equal parts, there is an odd series of each kind. The *odd ambulacral* series, above the mouth, must certainly be the anterior series, while, in the posterior part of the body, it is the *odd interambulacral* series that occupies the middle of the disc. It is also a remarkable fact, that in these animals the anus is always placed amongst the plates of the *latter* odd series. In the *Spatangi* we have therefore an anterior region indicated by the *odd ambulacral* series, and a posterior region indicated by the *odd interambulacral* series. On the two sides of the animal the series of plates are disposed in symmetrical pairs, so that on the left and on the right there are two pairs of ambulacral and two of interambulacral series. The first or anterior pair, which is contiguous to the *odd ambulacral* series, is a pair of interambulacral series, immediately behind which there are placed, first a pair of ambulacrals, next a second pair of interambulacrals, and finally a second pair of ambulacrals, which includes the *odd interambulacrals*, posterior and middle. Notwithstanding this radiated and at the same time symmetrical arrangement, the series of plates not being of equal breadth throughout their height, the *Spatangi* have, between the mouth and the anus, a disc formed by the greater or less dilatation of the posterior interambulacral series, on which they creep, and which is, in fact, the lower side of the animal; while its upper side is the region towards which all the series converge above the disc.

As to the *Clypeastres*, the *Galerites*, the *Neucleolites*, &c., which have the mouth in the centre and the anus marginal or submarginal, it is still easy to judge of the position of their parts, because the position of the posterior interambulacral series being given by that of the anus, there can be no difficulty in determining the symmetrical relations of the other series, both the odd and the even. There are even some differences observable in the form of the plates and the ambulacra of the several pairs; and the bilateral parity which these animals still retain is rendered perceptible by this circumstance.

At first sight it may seem more difficult to discover any

traces of this bilateral symmetry in the *Echini* and the *Asteria*, whether simple or ramified, and consequently to determine the antero-posterior diameter in animals whose mouth is perfectly central, and the anus, when there is one, is likewise situated in the central but upper part of the body. Nevertheless, even in this case, nothing is easier than to determine the relations which all the radiated parts bear to the longitudinal axis of the animal. It is true that all their rays so closely resemble each other in their external aspect, that it might seem of little or no consequence whether we observe in their generic arrangement those traces of bilateral symmetry which are so clearly visible in the *Spatangi*. But if we take into account the differences of structure in some plates of the several series, we shall be convinced that the same symmetrical parity is preserved here also, though under the appearance of a completely radiated disposition. We observe in fact on the upper part of the disc of the Echinodermata, especially in the *Echini*, the *Cidarites*, &c., in that region where the series of plates constituting the testa become convergent, some plates of a peculiar form, which are called *oviducal* and *interoviducal*, and communicate with the ovaria and the aquiferous system. These plates may serve as infallible guides in determining the regions of the body. The largest of them (generally to the number of five) alternate with the ambulacral series, so that they make two pairs and an odd one. The anterior pair is thus placed on the sides of the odd anterior ambulacrum; the second pair between the anterior and the posterior pair of ambulacra; and the fifth or odd plate, which is not always to be found in them, is situated between the two posterior ambulacra, that is to say, towards the anus or posterior part of the body. The structure of this fifth plate is of a peculiar porous kind analogous to that of the madreporiform body of the *Asterie*, and is found in the *Echini* also, but under a different form. In those which have but four oviducals, the plate which presents this peculiarity of structure is that which is wanting, and its place is then indicated by a depression or even a lacuna. Therefore, however regular the position of these plates in the *Cidarites* and circular *Echini* may be, we can, nevertheless, always determine the posterior extremity of their body by the odd plate, which

is also generally a little larger than the others: and in the oblong *Echinodermata*, should they have the mouth masked (which is often the case in the fossil species), the posterior end of the body may still be ascertained by the circumstance that an odd oviducal plate does not present itself between two of the ambulacra; for in this case, that these are always the two posterior ambulacra is evident from the position of the anus in those in which it is visible. We may therefore say that the direction of the anterior ambulacrum is always opposite to the odd oviducal plate, which is always placed towards the anus.

The analogy observable between the structure of the madreporiform body of the *Asteriæ*, and that of the odd oviducal plate of the *Echini*, is in these animals an important point of resemblance, which may help to guide us in determining the position of the parts in the first of these families, and enable us to discover in that also a bilateral arrangement. In fact, one of the five rays of the common *Asteriæ* is opposite to the madreporiform body, and must therefore be considered as the anterior ray, while the four others are placed in pairs on both sides of the longitudinal axis. The case is the same with the *Solasteriæ*, except that the number of rays arranged in pairs is greater, and that sometimes the odd rays are wanting.

Thus, whatever may be the external form of the *Echinodermata*, whether they are oblong like the *Spatangi*, and have the mouth and the anus placed towards two marginal extremities of the body opposite to each other, or are completely of the star form, circular, or even spherical, with the mouth and anus placed opposite to each other as the two poles of their spheres, it is still easy to observe in them a bilateral arrangement, and to determine which is the anterior and which the posterior region, as well as to see how all the parts are disposed in pairs on the two sides of the animal.

M. de Blainville has already observed the relations existing between the arrangement of the plates in the testa of the *Echini* and in that of the starfish, but has not formed a complete or precise idea of the connexion of those parts. He is perfectly right in giving the name of *ambulacral plates* to those which form the grooving of the inferior side of the rays, and that of *interambulacral* to those which are placed on their sides. In

order however to complete the analogy, the starfish must be represented as if swelled; then its back answers to the dorsal summit of the *Echini*, whence the ambulacra radiate even to the mouth, by passing in the starfishes through the extremities of the rays. We have thus, as in the *Clypeastres* and the *Spatangii*, two sorts of ambulacra, one at the upper and the other at the lower part of the animal. So far the analogy is complete; but in order to be justified in saying that the lateral plates of the rays are analogous to the interambulacral plates of the *Echini*, we must not consider the upper and lower plate of each side of a ray as forming a whole, though M. de Blainville seems to admit this; but we must conceive the upper lateral plate of a ray as if soldered to the corresponding upper part of the next ray; and the lower lateral plates are to be viewed in the same manner, by always supposing the two sides of the rays which bound the channel between two neighbouring rays to be united. It is in these interambulacral plates that the large thorns of certain starfishes are found, and these thorns are analogous to the spines of the large mammellæ to be seen in interambulacral plates of the *Echini*. In the starfishes there are also secondary spines surrounding the principal spines in greater or less regularity.

Besides the five oviducal plates, we observe at the summit of the *Echini* five other smaller plates, situated at the extremity of the ambulacra with which they are connected, and likewise perforated at one point, but all of the same structure as the larger. Mr. Gray has given them the name of *interoviducal plates*.

As to the membranous tubes issuing from the holes of the ambulacra, it is proper to remark that they do not in any way contribute to *locomotion*. It is rather amusing to trace the history of their advancement to the honours of this function. As they are placed, in the *Echini*, in bands, more or less narrow, between the large mammellated plates which bear the spines, the old naturalists, fancying that they bore some resemblance to the alleys or walks in a park, gave them the name of *ambulacra*, without describing with greater precision their nature and destined use. More recently the idea attached to the word ambulacra was extended to the organ which is placed amongst them, and has been, since then, most erroneously con-

sidered as a locomotive organ. How, in fact, could these small tentacula, with all their softness of texture, situated as they generally are in that part of the body which is never brought into contact with the ground when the animal moves, and overhung (*débordés*) by calcareous solid spines,—how, I ask, could these flexible tubes be used as organs of motion? It is an undeniable fact, and I have often observed it myself, that it is with their spines the *Echini* move themselves, seize their prey and bring it to their mouths, by turning the rays of their lower edge in different directions. But the correction of an error respecting the functions of the ambulacral tubes does not solve the problem relating to their nature and use. This problem we are yet unable to solve, as we know nothing more respecting them than that they are connected with the aquiferous system.

The position of the anus, in the true *Echini*, between the oviducal and interoviducal plates and those additional plates which surround the orifice at the dorsal summit, where the ambulacra terminate, has suggested the notion of a relation of dependence between the ambulacra and the posterior orifice of the alimentary canal. But this is far from being a correct notion; for the ambulacra, which have been often represented as extending from the anus to the mouth, invariably converge towards the upper part of the disc, where they appear in the form of a rosette more or less distinct, while the position of the anus varies considerably. It is not even median and superior except in the *Echini* properly so called and in the *Cidarites*. In all the other Echinodermata, in which it exists, it is situated between the two series of plates which form the posterior interambulacral space and diverge more or less from each other at its issue. In this case, which is the more frequent of the two, the anus has no direct communication with the ambulacral spaces.

The position of the dental apparatus, and particularly of the teeth themselves, with respect to the rays of the body, is an object which I would recommend to naturalists as well worthy of their attention; for at present I myself am unable to solve all the difficulties connected with the comparison of the different modifications of the dental system in the several genera of

Echinodermata. I shall therefore merely remark, in general, that the teeth alternate with the ambulacral spaces and are placed directly opposite to the middle of the interambulacral spaces, between the two series of plates which compose these, and to which they are attached by means of a very complicated apparatus. The structure of this apparatus, which is different in different genera, I shall describe as soon as my researches respecting it are more complete. As the teeth correspond to the interambulacral spaces, it is obvious enough that there must be an odd one. It is this odd tooth that is found behind on the antero-posterior axis itself. Its motion is directed forwards from the hinder part. The four other teeth are in pairs, and move laterally from right to left and from left to right in contrary directions on both sides of the mouth. Their motion may therefore be compared with that of the maxillæ of articulated animals, while the odd tooth may be considered as bearing some analogy to the lower lip of some of these. The space between the teeth and the lower orifice of the testa is covered with small moveable plates similar to those which surround the anus.

It is scarcely necessary to observe that the determination of these points must be of the utmost importance in examining the situation of the intestines and their mutual relations. Unfortunately, the state of the specimens which I had intended for dissection, did not allow me to investigate thoroughly all those points which I had wished to decide; and when I was dissecting some fresh specimens at the sea-side, I was not yet aware that it was possible to determine so precisely and positively the relation of the different regions of the body of these animals. I am therefore now obliged to postpone all further detail until I have completed this part of my labour. The facts which I have just stated appeared to me sufficiently remarkable to warrant their separate publication without an immediate review of the whole organization of this class. As to the manner in which I have designated the several regions of the *Echinodermata*, it may be objected that, most of these animals having the mouth beneath the disc, the side on which it is found cannot be considered as the anterior region of the body. But this denomination is no less correct on that ac-

count; and that the position of the animal in walking or swimming is not sufficient to guide us with reference to this point is evident from the case of the Mollusca and certain insects which swim on the back. Moreover, the anus of the Echinodermata is placed on the upper side, a situation different from that of the same organ in other animals. I feel therefore sufficiently warranted in considering the mouth as the principal point of departure and as determining the anterior part of the body. Do we not, in fact, see it placed in the fore part of the *Holothuria*, which by habitually moving on the same side approximates to the Vermes, and in the pedunculated starfishes, which, though fixed to the ground, uniformly put the mouth forward in balancing themselves on their stems? If, nevertheless, it were deemed advisable to adopt a different nomenclature, and to call that side on which the mouth is placed the lower side, that would make no change in the relations already pointed out: that which I call the upper would then become the forepart, that which I call the hind part would become the upper part, and the lower would become the hind part.

As I know not that anything has been yet published respecting the growth of the Echinodermata, I am the more inclined to think that the few observations which I have collected on this subject will be found interesting, at the same time that they will show the Echinodermata, whatever be their form, to be all subject to the same mode of development. The only known fact bearing on this point is, that the *Echini* and the starfishes consist of fewer pieces when they are young than at a more advanced age. It does not appear even that that there is any positive limit to their growth, though the several species habitually exhibit a sort of middle size which is proper to themselves, and from which the extremes are not very far removed. It is in the *Echini* more than any others, and especially in the *Cidarites*, that we find it most easy to decide on the exactness of this indication, although several authors appear to have sometimes forgotten it, particularly when their object has been to establish new species. But we have been told by no one *where* and *how* the new plates grow, and in what manner they are developed. In order clearly to comprehend the mode in which the Echinodermata grow, we

must steadily keep in view the general disposition of the solid pieces which form their integument. In the *Echini* these are plates, of larger or smaller dimensions, arranged in vertical zones which diverge from the mouth towards the periphery of the body, and thence seem to converge towards the superior centre. In the starfishes they are plates, the smallest of which are placed at the top of the rays, and the largest at the centre of the channel by which the rays are separated. We mark however three distinct types in the form of these animals: some tubular (the *Holothuria*), some spheroidal (the *Echini*), and others of the starform (the *Asteriæ*); but these types may be reduced to two, inasmuch as the tubular form may be considered an elongated spheroid; yet further, these two types may be reduced to the same plane of organization, since the large growth of the plates in the summits of a spheroid combined with the contraction of the interradial planes would produce a starfish; while, *vice versa*, the increase of the interradial planes and the reduction of the central plates in the starfish would produce a spheroid. Nor is this a mere hypothesis; we shall see hereafter that the essential difference between the *Echini* and the *Asteriæ* consists in the different modes of their growing. As to the disposition of the plates, there are in the *Echini* twenty series of them, forming ten zones, five of which are perforated and five not perforated. The five zones or double series of perforated plates are called the *ambulacral*, and the others the *interambulacral* series. In the starfishes the series formed by the solid plates are less regular and vary in number: however, in those starfishes that have large plates at the edges of the rays, we see that these plates correspond with the interambulacral series of the *Echini*, while each ray has a complete ambulacral series which extends from the mouth along the extremity of the ray to the superior centre, and the middle of which, at the extremity of the ray, is consequently narrower than the ends: in the *Echini*, on the contrary, each series is broadest in the middle and narrowest at the extremities. If we now attentively examine an *Echinus* of the middle size (among those of its own species), we shall find, especially in the genera *Cidaris* and *Echinus*, that the plates of the several series are not so strongly attached to each other

at the dorsal summit, and that the spines which they bear in this region are less fully developed. If, carrying the examination still further, we remove the spines, we shall then observe that amongst the oviducal and interoviducal plates and the interambulacral plates that bear spines there are some less fully developed, irregular in form, wanting even the mamellæ and the spines, and taking their place among the mammellated plates only in proportion as they gradually attain to a larger size. The new plates are at first very small, and may be compared to points of ossification which at first grow simultaneously in all directions, though their lower side completes its formation sooner than the upper, and the upper side is sometimes yet incomplete, even when an incipient mammella is observable in the middle of it. In the region of the body where this increase takes place, the membrane which unites all the plates and spreads itself over their surface, forming an articular capsule about the base of the spines, is softer and more spongy than it is in the inferior part where the plates are consolidated and immoveable. It is in fact this spongy mass that deposits the calcareous matter of which the plates are composed: and the spines shoot out in the centre almost in the same manner as the horns of a stag. They do not become moveable until they have attained a certain stage of development, and there is a period in their growth after which their size does not increase. Those however which drop off accidentally are replaced by others, formed, as those had been, by the tumefaction of the membrane which covers the plates. We may always observe in a single specimen of the *Cidaris* all the gradations of increase, from that of the plates which have completed their growth and bear spines several inches long, down to the smallest points of ossification of the plates yet unfurnished with spines. These facts I have ascertained by examining several individual specimens which exhibited all the intermediate stages of development through which the pieces in question must pass: and indeed, when we have no direct means of observing the growth of an animal in one individual, the only resource left us is to compare a great number of individuals representing a complete series of all the stages through which the species to which they belong has to pass before their

growth is completed. The only difference between this process and the *direct* observation of any development is, that in the one case we observe in one and the same individual that succession of changes, which in the other we trace through a series, as complete as possible, of several individuals. Such is the course that I have taken with respect to the Echinodermata. The young *Echini* have a small number of plates in each of their vertical series; they appear to be slowly increased in size by the deposition of calcareous matter at their circumference until those which surround the mouth have completed their growth and are entirely consolidated. The superior plates continuing to grow, increase, from the top downwards, the periphery of the body, which remains depressed so long as the inferior are the only plates consolidated; but in proportion as a greater number of plates become immoveable, and as there is formed, in the upper region, a greater number of plates reaching down to the circumference of the spheroid, the testa becomes rounded and finally assumes a spherical form. It is to this cause that we are to ascribe the differences of contour exhibited by the *Echini* at different ages. In some species there are found individuals presenting even a pyramidal shape, and this takes place when there is still formed a great number of plates subsequently to the consolidation of those occupying the greater diameter of the animal's body. These facts sufficiently explain the gradual growth of beings which approximate more or less nearly to the spherical form, and show how carefully we should guard against the introduction of nominal species in consequence of a mere difference of form resulting from age only.

It would be interesting to trace the development of these animals *ab ovo*. But no naturalist has yet observed the state of the *Echini* on their first issuing from the egg. As to the spines, it is evident, especially in the *Cidarites*, that those surrounding the mouth are the first that attain their full growth, while the largest are those in the upper tier of the disc; and those which have not yet completed their growth are found around the oviducal plates on the outside. The correctness of these observations will be demonstrated by comparing the differences of development exhibited in this region by the spines

that stand nearest to each other. We should be mistaken however as to the growth of the *Echinodermata*, did we think that there is a generic connexion between the plates, on account of their forming vertical series from the mouth to the summit of the disc. It has been already remarked that the plates of each space are alternately a little more elevated than each other, but no attention has been paid to the manner in which the plates of all the spaces succeed each other in the same *Echinus*; and yet, if we consider it closely, we shall see that the new plates are developed in spiral lines, passing, without interruption, from one series to another through all the spaces from the circumference of the mouth to the dorsal summit, so that those which rest on each other in a vertical line do not make their appearance in immediate succession. It appears to me well worthy of remark, that in these animals, holding so low a rank among organized beings, we should find the succession of the solid parts composing their integument so strikingly analogous to the arrangement of the leaves around the stems of plants;—an arrangement, the laws of which have been recently discovered by M. Schimper, and explained, so far as regards the *Corniferae*, in a memoir of M. Braun on the arrangement of the scales of their cones.

The small plates surrounding the mouth and those around the anus are arranged in a peculiar manner; they are easily moved, and thus facilitate the deglutition of the food and the voiding of the excrements. In general the testa of the *Echini* is not so immoveable as one who had not observed them in a fresh state might be led to suppose. All the plates forming the upper part of the disc are often set in motion: sometimes they sink, sometimes they rise, and, in the oblong species, the longitudinal diameter is often extended beyond its ordinary length. The great mobility of the spines, the variety of their movements, and the manner in which they help the animal to seize its food, have been already noticed.

The growth of the starfishes and the *Crinoïdes* will appear to be carried on by a process exactly the same, as soon as it is agreed that an ambulacral space of an *Echinus* answers to an ambulacral surface of a starfish, and that an interambulacral space of the former answers to the large marginal pieces of

two contiguous rays in the latter: for the pieces exhibiting its growth are formed in the angles of the rays on the upper and lower surface of the body, and, becoming larger and larger, elongate the rays and drive the extremities of them to a greater distance; so that the number of the plates continually increases and cannot be considered as a specific characteristic. The growth of the summit in the *Asteria* and of the stem in the *Crinoïdes*, as well as that of the moveable pieces of the mouth, is also independent of the rays in these animals, and accompanied by a peculiar position of their parts, as in the *Echini*. Hence it is easy to conceive how a body of the star kind may grow larger and still retain its form.

The study of the organization of the Echinodermata has led me to introduce in their classification and in the defining of their genera some changes, which I shall also exhibit in a synoptical table. I found that the characters deduced from the combination of the plates and the arrangement of the ambulacra formed groups more natural and better defined than those deduced from the position of the mouth and the anus.

The class of the Echinodermata is divided into three orders: the *Stellerides*, the *Echinides*, and the *Fistulides*, which resemble in the degree of their organization the three classes of the Radiata. The *Stellerides* answer to the class of the Polypi; the *Echinides* to that of the Acalephæ, which connect the section of the Radiata with the Mollusca; while the *Fistulides*, as the culminating point of this division, represent the section of the articulated animals, and more especially the Vermes.

As to the genera established in this class, I found that the characters deduced from the combination of the plates and the disposition of the ambulacra formed groups more natural and better defined than those deduced from the situation of the mouth and the anus. My observations on this subject I shall publish in a monographic paper (accompanied with plates), for which I have already collected most of the necessary materials.

[To be continued.]

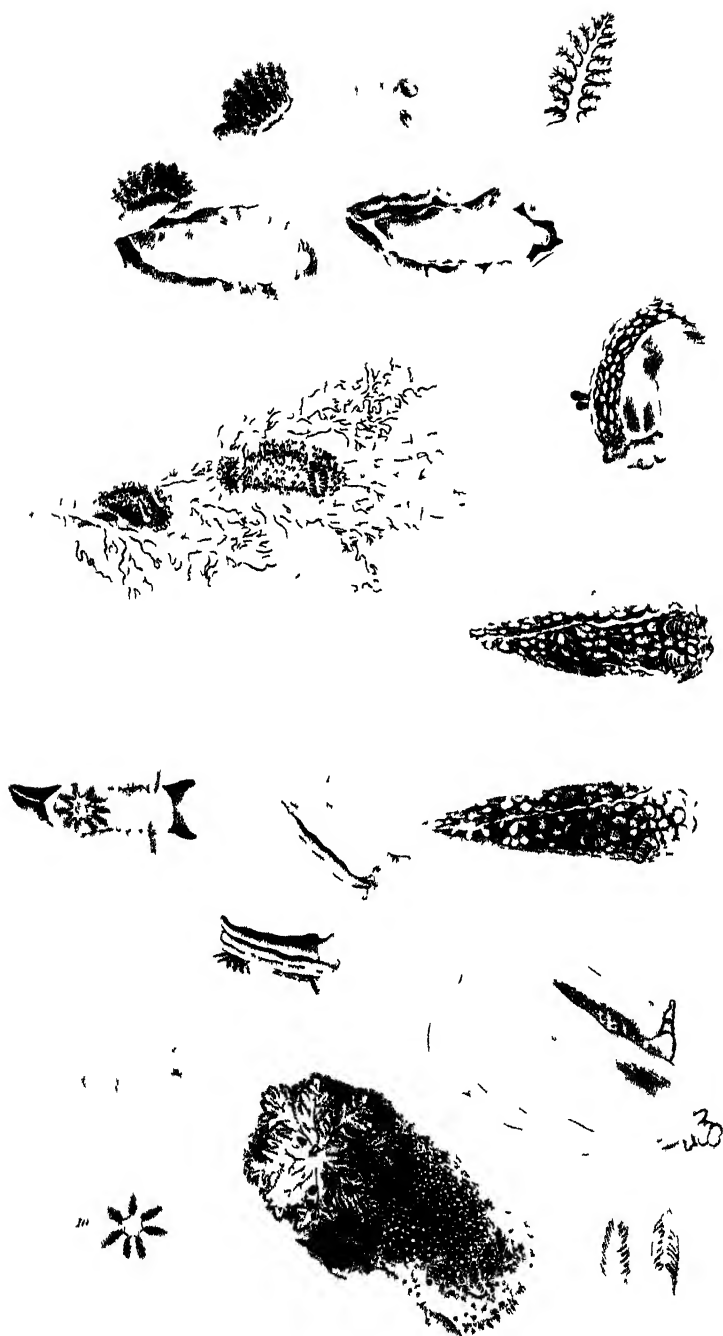
VI.—*Miscellanea Zoologica*. By GEORGE JOHNSTON, M.D.,
Fellow of the Royal College of Surgeons of Edinburgh.
Plates II. and III.

(Continued from Magazine of Zoology and Botany, ii. p. 73.)

IV.—THE SCOTTISH MOLLUSCA NUDIBRANCHIA.

CHARACTER. *Mollusca* gastropodous, shellless, bisexous : *branchiæ* external, dorsal, always symmetrical, placed either posteriorly in the median line or along the sides : *tentacula* from one to three pairs, more or less retractile : *eyes* sessile or none : *head* scarcely marked. NUDIBRANCHES, *Cuvier, Règ. Anim.* iii. 50. *Rang, Manuel*, 124.—TRITONIENS, *Lamarck, Anim. s. Vert.* vi. i. 298.

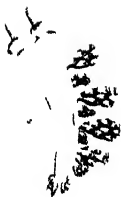
THE Nudibranchia are all natives of the sea, where they represent the land slugs, to which they have a considerable degree of outward resemblance, and are otherwise allied to them in structure and habits. Like the slugs they crawl on a muscular disk or foot which occupies the entire length of the body ; their mode of progression is of the same slow and continuous nature ; a glairy fluid exudes from miliary glands imbedded in the skin to render the surface lubricous, less resistant, and less liable to injury from friction ; both tribes are equally vegetable feeders ; and they are also hermaphrodites after the same remarkable fashion. What peculiarly distinguishes the present order is the external position of the *branchiæ* or breathing organs, where placed on the back they float in the oxygenating medium, and require no subsidiary apparatus to bring this into contact with the blood. In form and location these organs are exceedingly diversified, becoming, when fully displayed, the creature's principal ornament, and its most obvious claim to our notice and admiration. They are placed on the posterior part of the body in the *Dorides*, where they form a circle of arborescent leaflets, which can be drawn within at pleasure and removed from injury ; but in all the other genera they are incapable of retraction, and are distributed on the sides and over the back in a pattern each after its kind. To aid them in their important function, we find that the surface of these branchial leaflets or filaments is clothed with minute cilia, which by a quick and constant succession of vibrations in



SCENE II



...



a determinate direction propel the water over it in corresponding currents, and thus supply a never-failing stream of unbreathed water*.

The varied position of the branchiæ necessarily implies some corresponding peculiarities in the arrangement of the circulating system. It is a general rule in physiology that the heart shall be placed in the immediate vicinity of the organs which air the blood; and accordingly it is found situated, in the *Doris*, far backwards, just anterior to the branchial circle; while in the other genera, which have the branchiæ distributed along the sides, its position is more forwards and nearly central. It is a strong muscular organ, consisting of an auricular and a ventricular cavity, separated by two semilunar valves, and its inner surface is netted with numerous fleshy columns, like the heart of a vertebrate animal. Receiving the blood, or what, because of its cold and colourless qualities, Linnaeus called the *saries*, from vessels bringing it in a purified condition from the gills, it propels the stream forward into an aorta, by whose divergent ramifications this is led to every part and organ of the body. By venous vessels, nearly parallel but running in the contrary course, the blood is again returned, the vessels as they trend inwards uniting repeatedly, until, after many unions and coalescences, they form two or one large trunks that serve the place of a pulmonic heart. In the *Tritoniadæ* these vessels run parallel, two along each side of the body, in correspondency with the position of the branchiæ, and give off a small branch to every tuft and filament of them; but in *Doris* they keep a more central and medial course. The blood collected in them is effete and unfit to continue life; but by numerous branchlets which depart from these trunks and ramify through the gills, it is again dispersed and exposed to the oxygenating medium before it re-enters the heart to begin again the ceaseless circuit.

The nervous system consists of four ganglions placed over the origin of the œsophagus, from which filaments are sent to the different organs, to the foot, and cutaneous envelope. There is neither other ganglion nor plexus. From this sim-

* Sharpey in Cyclop. Anat. and Phys. i. 620.

plicity of plan, it is probable that the instincts and sensibilities of these mollusca are few and of a low character*,

..... animal sine fraude, dolisque,
Innocuum, simplex,.....

and we know no trait in their habits that is repugnant to this inference. Cuvier says he could detect no evidence for the existence of more senses than sight and touch: the former is seated in the small black specks which may be seen, in some of the genera, at the bases of the tentacula; the latter sense has no particular locality, but is diffused over the whole surface, though exercised more especially, and with greatest delicacy, by means of the endermoid processes, such as the tentacula and branchial fringes. I cannot, however, but suspect that the tentacula have some more specific use; for their structure, in *Doris* and *Tritonia* at least, is complex, and their position ill suited to organs intended to be employed as tactors. Blainville supposes, with some show of reason, that they may be organs of smell†; and, we may add, perhaps of hearing also. "The slow-moving molluscous animals," says Professor Grant, "are less provided with organs for perceiving the properties of outward bodies than the active articulated classes; but many of the higher pulmonated gasterops seem both to hear and to smell, although the precise seats of these feelings have not been determined, and *Tritonia arborescens* emits audible sounds under water, which are, without doubt, intended to be heard by others of the same species, as we see in insects, and probably to serve as a means of communication between these hermaphrodite and almost blind animals, although the organs have not been detected which are appropriated to their perception‡".

Some foreign species are rapid in their movements, swimming with ease in the ocean and on its surface, but the pro-

* Lamarck, Anim. s. Vert. vi. i. 265.

† "Enfin une autre opinion qui est la nôtre, c'est que c'est l'extrémité des tentacules véritables, ou de la première paire d'appendices qui est l'organe d'olfaction. La peau y est en effet encore plus molle, plus lisse, plus délicate que dans aucun autre endroit, et le nerf qui s'y rend est plus considérable."—Man. de Malacologie, 107. Carus's objection to this opinion appears to be founded on a verbal quibble.—See Comp. Anat. i. 73. Trans.

‡ Outlines of Comp. Anat. 279.

gression of our natives is usually slow, even, and continuous. They creep along the bottom or among the branches of coral-lines; but when confined in a basin they ascend to the surface, place themselves in a reversed position, and thus glide along it with ease, aiding themselves by undulations of the cloak and its expansions. Lamarek erroneously asserts that the *Eolides* and *Tritonia* cannot swim*, for this seems in fact to be their favourite mode of progression, and in which they exert their locomotive powers with most success. When laid on the surface I have seen several of the smaller sorts form the posterior edge of the foot or tail into a kind of circular sucker, and by its means hang pendent for some time.

The mouth is situated in the front of the nearly acephalous body between the overlapping cloak and the foot: it is a sub-circular or vertical aperture with fleshy lips, which the *Doris* can protrude to a considerable extent to form a short proboscis. At the sides of the mouth there is usually a pair of fleshy filaments, more or less elongated, which appear to perform the office of feelers to guard against the entrance of noisome food, and to select what may be agreeable; and above it we perceive a development of the cloak with a lacinated margin which has received the denomination of the oral veil. The mouth is either emaxillary, or, as in *Tritonia*, furnished with a pair of large corneous jaws, which, moved by powerful transverse muscles, serve to divide the sea-weed on which the animals feed†; the fare of the others being presumed to be of a softer nature and less restricted in kind‡. Forced by appropriate muscles down the oral or proboscideous canal, the food is next laid hold on by the tongue, a broad membrane of the most delicate and beautiful mechanism, consisting of a lace-work of minute prickles set in regular array with their sharp points all pointed backwards§. Passing over this membrane the vegetable tex-

* Anim. s. Vert. vi. i. 301 and 304.

† “Ces deux lames sont fort tranchantes, et il n'est rien de vivant qu'elles ne puissent couper lorsque l'animal en fait glisser les deux tranchans l'un sur l'autre.”—Cuvier, Mém. sur la *Tritonia*, p. 11.

‡ Risso says that the nourishment of the Nudibranchia consists of small zoophytes.—Hist. Nat. de l'Europ. Mérid. iv. 40; see also Loudon's Mag. Nat. Hist. viii. 78.

§ Dr. Fleming says that the tongue of *Tritonia* “differs remarkably from the same member in the *Doris*. In the latter, the spines with which it is

ture is rasped and frittered down, and in this dissolved state the mass is again brought forward by the regulated contractions of the adjoining muscles, and the peristaltic motions of the tongue itself, to be forced down the œsophagus into the stomach, which is simply a membranous dilatation of the alimentary canal. This canal is very short, scarcely equal to the length of the body, a fact which may seem irreconcilable with the unnutritive character of their fare; but the want of length is probably compensated by the unusual size and complexity of the salivary glands, and perhaps also of the liver*, which lies in the immediate proximity of the stomach, and more or less envelops it, pouring in its copious secretion by several apertures. In *Doris* there is another singular organ which sheds its secretion into the stomach, a vesicle with the inner surface roughened with conical papillæ, but which has no direct communication with the substance of the liver. Dr. Grant considers this organ to be analogous to the pancreas in higher animals†.

The Nudibranchia are hermaphrodites of a peculiar kind: each individual possesses the organs of both sexes, but is incapable of self-impregnation, and requires the aid of another to render the ova fruitful. These are deposited on the under sides of stones, on shells, and on the roots and fronds of seaweed, in glutinous masses, which are sometimes broad and flat like a ribbon, and at other times more like ravelled thread. The number of ova in each mass is prodigiously great, and they are usually arranged in regular lines, straight or zig-zag, each ovum, or perhaps two or three, inclosed in a separate vesicle imbedded in the common mass, which is itself covered by a membrane of the most perfect transparency. The embryo,

beset are reflected, and draw the food to the gullet; while in the former, the spines are deflected, and serve to keep the food within the reach of the awes. The tongue of the *Doris*, therefore, serves for deglutition, that of the *Tritonia* for mastication."—Phil. of Zoology, ii. 469. I have not noticed this distinction; and it should be remembered that the prickles are moveable and may be directed either backwards or forwards, though the former is their ordinary position.

* According to Cuvier the liver is not comparatively large, at least in *Tritonia*.—Mém. p. 12. But Blainville says that the liver has always appeared to him to be larger in phytophagous than in zoophagous mollusca.—Man. de Malacologie, 124.

† Loudon's Mag. Nat. Hist. viii. 79.

while in the ovum, has been observed to have a rotatory motion produced by vibratile cilia placed on the exterior; a motion, which appears destined to bring a constant supply and renewal of sea-water into the interior of the organization, in order to perfect the animal before it is, as it were, launched into the ocean. Possibly, also, the continued friction of the cilia against the interior of the egg may tend to abrade it, and open a passage for the young animal*.

There are few Scottish species of the order hitherto ascertained, but I have found the task of determining them, and their synonymy, very difficult and irksome. This has resulted partly from the meagreness of their descriptions in Linnæan authors, partly from the want of access to some expensive works containing figures that might have supplied this deficiency of detail, and partly from the difficulty of ascertaining the extent of variation in the species themselves. In the hope, however, of drawing attention to so interesting a tribe, and of laying a foundation for a more accurate knowledge of it, I offer the result of my study to the British naturalist, persuaded that he will receive with indulgence an essay that neither care nor industry has been able to free from imperfection and doubts.

Family I. DORIDÆ.

Branchiæ retractile, posterior and dorsal, placed in a circle round the anus. CYCLOBRANCHIATA, *Blainville, Man.* 488.—UROBRANCHIA, *Latreille, Fam. du Règ. Anim.* 173.—LES DORIS, *Rang, Man.* 131.

1. DORIS. *Dorsal tentacula* lamellated: *anus* without scales.

Family II. TRITONIADÆ.

Branchiæ non-retractile, lateral and dorsal: *anus* lateral and anterior. POLYBRANCHIATA, *Blainville, Man.* 484.

- * *Branchiæ arbuscular*: *dorsal tentacula* two, retractile within a sheath at their base. DICERATA, *Blainville, Man.* 487.—SERIBRANCHIA, *Latreille, Fam. du Règ. Anim.* 174.—LES TRITONIES, *Rang, Man.* 128.

2. TRITONIA. *Branchiæ* arborescent: *tentacula* fissile and pectinate.

3. MELIBEA. *Branchiæ* ovate, muricate: *tentacula* filiform, simple.

* Roget, *Bridgew. Treatise*, i. 216.

** *Branchiæ papillary* : tentacula two or three pairs, sheathless, contractile, simple. TETRACERATA, Blainville, *Man.* 484.—PHYLLORANCHIA, Latreille, *Fam. du Règ. Anim.* 175.—LES GLAUQUES, Rang, *Man.* 125.

4. EOLIDIA. *Branchiæ papillary*, undivided.

*** *Branchiæ papillary*, scattered : dorsal tentacula two only, imbricate.

5. TRIOPA. *Branchiæ* simple, and, as well as the *tentacula*, without a sheath.

1. DORIS†, Linnaeus.

CHARACTER. *Body* acephalous, ovate-depressed with the margin of the cloak free, or prismatic and limaciform : *mou*th probosciform with a pair of labial tentacula : *dorsal tentacula* 2, lamellated and retractile : *anus* posterior, dorsal and mesial, encircled with the arborescent or pinnate branchiæ, which are retractile within a sort of cup : *foot* plane : orifice of the organs of generation on the right side and anterior. Cuvier, *Règ. Anim.* iii. 51. Lamarck, *Anim. s. Vert.* vi. i. 309. Rang, *Man.* 132. Blainville, *Malacol.* 488.

* *Margin of the cloak overlapping the foot.*

1. *D. tuberculata*, body ovate-depressed, above closely tuberculate, the margin of the cloak rather narrow ; orifices of the tentacula without sheaths ; leaflets of the branchiæ 8, plumose. Plate II. fig. 1—3.

Doris tuberculata, Cuv. *Mém.* v. 23. pl. 2. fig. 5. *Lam. Anim. s. Vert.* vi. i. 311. Johnston in *Zool. Journ.* iv. 416.—*Doris* Argo, *Pen. Brit. Zool.* iv. 82. pl. 24. malè. Jameson in *Wern. Mem.* i. 556. *Stew. Elem.* i. 387. *Turt. Gmel.* iv. 77. *Turt. Brit. Faun.* 133. *Blumenbach, Nat. Hist.* 245. *Fleming in Edin. Phil. Journ.* viii. 295 ; and *Edin. Encyclop.* xiv. 618. *Grant in Edin. Phil. Journ.* xiii. 198. *Flem. Brit. Anim.* 282.—*D. Argus*, *Stark, Elem.* ii. 68.—*D. Pseudo-argus*, *Rapp in Nov. Act. Phy. Med. Acad. Cæs. Leop. Car. Nat. Cur.* xiii. 519.

Hab. "Among the sea-weeds and crevices of rocks near low-water mark, common," *Rev. Dr. Fleming.* On the rocks near the Beacon at Leith, *Professor Jameson.* Frith of Forth, *Dr. Grant.* Bell-Rock and Isle of May, common, *Rev. Dr. Fleming.* On the E. shore of Bute, *Dr. Coldstream.* Coast of Berwickshire, occasionally.

DESC. *Body* sometimes three inches long and nearly two broad, ovate-depressed. *Cloak* usually grey, sometimes straw-coloured or sulphur-yellow, marbled with cinereous and pink blotches, and closely covered with small round unequal tuber-

† The mother of the sea-nymphs called Nereides.

cles of a bluish colour; its margin entire, somewhat undulate, overlapping. Space between the cloak and foot white or yellow, smooth; the foot varying from pale yellow to an orange, plane and broad. *Dorsal tentacula* conical, short, the upper half yellow and lamellate*, the base white and smooth, issuing from sheaths level with the surface. *Branchiæ* of 8 large tri-pinnate plumose leaflets, some so deeply divided that the leaflets appear to be eleven or twelve†, of a light blue colour irregularly spotted with white and yellow about their bases. *Anus* prominent, tubular, whence, in many specimens, lines of a sulphur colour diverge to the branchiæ.

When handled the cloak has a cartilaginous somewhat gritty feel, from containing in its texture a vast number of crystalline spicula, clustered more especially in the tubercles. These spicula are cylindrical, slightly curved, obtuse at both ends, sometimes bulged about the middle, colourless, pellucid and calcareous, for they dissolve readily in weak acids. Similar spicula are to be found in the tentacula radiating from the centre, in the branchiæ and in the foot; but less thickly set than in the cloak, and perhaps less regular in their figure.

D. tuberculata is a very sluggish creature. When kept in a vessel until the water becomes unfit for respiration, it discharges, in dying, a large quantity of a gelatinous fluid from the skin, and some dirty greenish liquor from a small aperture placed before and a little to the right of the anus. This is the orifice of a duct which takes its origin from the liver, so that this viscus, besides the bile, appears to prepare another excremental secretion, that may, perhaps, be of use to the animal in rendering it disagreeable to its enemies. Of such a combination of functions there is no other example among animals, and the fact was so strange and anomalous that repeated careful dissections were required to convince Cuvier of its reality; and, after no further doubt could be entertained, he suggested a possibility of two glands being here so inti-

* Cuvier says, these tentacula "sont toujours composés de petits feuillets extraordinairement minces, empilés les uns sur les autres, et comme enfilés dans un pédicule commun."—*Mém sur le Doris*, p. 12.

† Rapp, under his description of *Doris grandiflora*, says that the number of branchial leaflets cannot be used as a specific character, because they vary considerably in this respect in different individuals.—an observation which I believe to be applicable to the genus.

mately interlaced that no dissection could unravel the portions that belonged to each*.

Cuvier's description and figure of his *Doris tuberculata* apply with such sufficient exactness to our Scottish species as to render their identity scarcely doubtful. I have been informed by Mr. J. E. Gray, to whom a specimen was sent, that it is the same as the English ones from the coast of Devonshire, usually confounded with the *D. Argus*, but which are, or were, labelled in the British Museum as *D. Britannica* or *D. Montagu*. The *D. tuberculata* of Rapp in *Nov. Act. Acad. Nat. Cur.* tom. xiii. p. 521. tab. 27. fig. 4. 5. appears to me distinct from Cuvier's, in having the cloak sprinkled with granules merely and not tuberculated, and in the greater proportional breadth of the margin. It seems to be nearly allied to the following species.

2. *D. obvelata*, body ovate-depressed, the cloak even and finely granulated with a rather broad margin; tentacular sheaths level with the surface; branchial leaflets bipinnate, about 15, forming a cup when expanded. Plate II. fig. 4—7.

Doris obvelata, Mull. *Zool. Dan. Prod.* 229. *Turt. Gmel.* iv. 79. *Lam. Anim. s. Vert.* vi. i. 311.

Hab. On rocks under sea-weeds near low-water mark. Berwick Bay, where it was discovered by Mr. J. Alder of Newcastle.

DESC. *Body* nearly one inch long, one third as broad, elliptical, depressed, equally rounded at both ends, of a uniform yellowish-white colour, usually dashed with a few dusky spots. *Cloak* even, smooth and punctate to the naked eye, but really finely granulated, as it appears through a common magnifier, the border rather broad, undulated and plain. Space between the cloak and foot smooth. *Dorsal tentacula* short, ovate, bulged, obscurely lamellated, issuing from apertures without any sheaths. *Branchiæ* surrounding the nipple-like vent in an entire circle, forming by their union a beautiful cupped blossom: there are fifteen leaflets of equal size, bipinnate, not

* "En voilà le premier exemple dans la nature, et la chose était assez singulière pour me faire douter long-temps, et pour me faire mettre dans cet examen toutes les précautions possibles. Il n'y a qu'une seule supposition à faire qui soit contraire à mon idée; c'est que les lobules de deux glandes différentes seroient tellement entrelacés, qu'on ne pourroit les distinguer à la vue; une partie de ces lobules seroit hépatique, et produiroit la bile; l'autre donneroit la liqueur que le canal en question transmet au dehors."—Cuv. *Mém. sur le genre Doris*, p. 16.

spreading, white. *Foot* ovate, white, undulated. Innumerable calcareous spicula enter into the composition of the cloak and skin.

This is readily distinguished from every variety of the preceding by the chalice form which the branchiæ assume when displayed and by the smoothness of the cloak. I have not seen Muller's figure of *D. obvelata*, but the specific character which Lamarck gives of it is very suitable to our species:—"corpore ovali-oblongo, suprà tuberculis parvis punctato; velo marginali lato repando."

3. *D. bilamellata*, body ovate-depressed, the cloak rough, with equal tubercles; branchiæ short, numerous, simply pectinate, forming an uninterrupted circle. Plate II. fig. 8.

Doris bilamellata, Linn. *Syst.* 1083.—*D. fusca*, Mull. *Zool. Dan. Prod.* 229 *Zool. Dan. tab.* 17. fig. 6 9. *Lam. Anon. s. Vert.* vi. 1. 312. *D. verrucosa*, Penn. *Brit. Zool.* iv. 82. pl. 23. fig. 2. male. *Turt. Gmel.* iv. 77. *Turt. Brit. Faun.* 133. *Fleming in Edin. Encycl.* p. xiv. 618. *Stew. Elem.* 1. 356. *Flem. Brit. Anm.* 282.—*Tritonella verrucosa*, Jameson in *Wern. Mem.* 1. 556.

Hab. On rocks near low-water mark. The sea near Aberdeen, Pennant. Leith shore and Shetland Islands, Prof. Jameson. Coast of Berwickshire, not uncommon.

DESC. *Body* about an inch long, oval, depressed, nearly equal in breadth at both ends, which are rounded and plain. *Cloak* mottled and clouded generally with brown of various tints, rough or muricated with numerous nearly equal small tubercles, the margin rather narrow. *Dorsal tentacula* conical, smooth towards the base, closely imbricate on the upper half, retractile within a simple cavity that sometimes appears like an ocellated spot. *Branchiæ* forming a circle of not less than twelve simply pectinated short leaflets retractile within a depression with an entire rim. *Foot* oval, white except where stained by the interracia. As in the preceding species, the cloak contains an immense number of calcareous spicula, of unequal sizes, and aggregated more particularly in the tubercles.

This pretty species is subject to great variety in colour, and I have seen one or two individuals which were entirely white. It agrees so well with Linnaeus's description of *D. bilamellata* that I have not hesitated to adopt his name; and the figure of Pennant is sufficient to enable any one conversant with the

appearance and habits of the creature to identify it as his *D. verrucosa*. The wonder is how this should ever have been considered the same with the *D. verrucosa* of Linnæus and Cuvier,—a large species found in the Indian seas, and different in every respect. Dr. Fleming says the branchial plumes are about twenty-four in number, “arranged in a semicircle, those at each end shortest.” It is very difficult to ascertain their exact number from their close apposition, but I think they do not much exceed twelve.

4. *D. lævis*, “cloak smooth in the middle, slightly tuberculated towards the margin; branchial plumes eight in number.” *Fleming*.

Doris lævis, *Lin. Syst.* 1083. *Mull. Zool. Dan. Prod.* 229. *Turt. Gmel.* iv. 79. *Cuv. Mém.* v. 26. *Fleming in Edin. Encyclop.* xiv. 618. *Lam. Anim. s. Vert.* vi. i. 312. *Flem. Brit. Anim.* 282.

Hab. “Common among the Zetland Isles,” *Rev. Dr. Fleming*.

DESC. “Length about half an inch, rounded in front, narrow behind; of a milk-white colour.” *Fleming*.

5. *D. pilosa*, body ovate, tumid, the cloak tomentose with an ample margin; branchiæ from 7 to 9, plumose. Plate II. fig. 9, 10.

Doris pilosa, *Turt. Gmel.* iv. 79. *Lam. Anim. s. Vert.* vi. i. 312. *Cuv. Mém.* v. 26.—*D. tomentosa*? *Cuv. loc. cit.* 26.

Hab. Under Algæ between tide marks. Coast of Berwickshire, occasionally.

DESC. *Body* less than an inch in length, oval, very convex dorsally, snow-white, but so pellucid that its purity is slightly stained by the opacity of the internal viscera: the *cloak* tomentose with small papillæ, the margin ample and plain. *Foot* oval, obtuse. *Dorsal tentacula* yellowish, cylindrical, lamellate, without sheaths. Veil above the mouth large, somewhat triangular, produced at the superior angles. *Branchiæ* white like the body, beautifully plumose, the leaflets about seven, but it was difficult to ascertain the number exactly.—The specific name *tomentosa* so well expresses the white woolly appearance of the cloak in this species that it seems preferable to *pilosa*, but I feel so far persuaded that the names have been applied to variations of the same animal as to prefer that which has the claim of priority.

6. *D. nodosa*, "cloak with four equidistant papillæ on each side the medial line." *Fleming*.

Doris nodosa, *Montagu in Linn. Trans.* ix. 107. pl. 7. fig. 2. *Fleming in Edin. Encyclop.* xiv. 618. *Pen. Brit. Zool.* iv. 85. *Flem. Brit. Anim.* 282.

Hab. "Among the rocks at St. Andrew's," *Rev. Dr. Fleming*.

DESC.

7. *D. nigricans*, "cloak thickly covered with short lanceolate tubercles; branchial plumes about eight in number." *Fleming*.

Doris nigricans, *Fleming in Edin. Encyclop.* xiv. 618. *Flem. Brit. Anim.* 283.

Hab. "Zetland," *Rev. Dr. Fleming*.

DESC. "Length about half an inch, pale, freckled with dusky; cloak emarginate anteriorly; sheath of the superior tentacula notched in the margin." *Fleming*. May not this be a variety of *D. pilosa*?

•• *Body prismatic.*

8. *D. Barvicensis*, body smooth; branchial leaflets eight, plumose. Plate II. fig. 11—13.

Doris electrina ?? *Pen. Brit. Zool.* iv. 83. pl. 26. fig. 1. *Stew. Elem.* i. 387.—*D. bilamellata* ?? *Turt. Brit. Faun.* 134.

Hab. Amongst corallines in deep water. Coast of Berwickshire, rare.

DESC. *Body* prismatic, $\frac{6}{10}$ ths of an inch long, about one-third as broad, of a white watery colour irregularly clouded with sulphur-yellow and pink, (the latter dependent on the viscera,) and sprinkled all over with minute white dots. Back smooth, the cloak adnate, thickened at the sides, where it forms a sort of narrow membranous rim. Sides abrupt, smooth. *Foot* elongated beyond the cloak and tapered to an obtuse depressed tail, white, with a yellowish medial line and a thin pellucid edge, the anterior angles produced into two distinct tentacular processes. *Dorsal tentacula* cylindrical, yellowish, the upper half lamellated with the shaft lengthened into a small mucro; they issue from wide sheaths emarginate on their inner sides. Branchial leaflets eight, when moderately extended like papillæ or tubercles, but when fully expanded they are somewhat plumose and encircle the prominent tubular vent, from which white lines radiate to the branchiæ: just behind the branchial

circle and behind the anus there is a small but distinct orifice of a deep red colour.

This description is taken from a single specimen, the only one I ever saw, and it is probable that the colour may vary in different individuals. It seemed fond of swimming in a reversed position; and evacuated some small pellets of a bright red colour while in confinement, but it was not ascertained whether these came from the vent or the adjoining excremental orifice.

[To be continued]

VII.—*Information respecting Botanical Travellers.*

LETTERS have lately been received from Mr. Cuming, (so well known by his splendid South American collections of Natural History,) dated Manilla, Dec. 24, 1836; from Dr. Schomburgh, dated New Amsterdam, Berbice, April 8th, 1837, Demerara, August 8th, 1837; from Mr. Gardner, dated Organ Mountains, Brazil, April 5th, 1837.

Mr. Cuming had reached Manilla in July of last year, just as the rainy season had set in, when he was unable to make any excursions until the end of September. He then left Manilla for the Hacienda of Calaguan in the centre of Luyon, where he remained until the 15th of December, visiting and exploring the woods and mountains in the neighbourhood, and then returned to Manilla with his collections. These consist of about 1150 species found in the island of Luyon; and of these nearly one-tenth are ferns of the most varied and beautiful forms; two of them are tree-ferns; and one he describes as constituting a shrub, throwing out branches like the fir; and with the exception of a few, they were all found in fructification. He secured about 60 species of *Orchideæ*, of which the greater part were not in flower; many species of Mosses, and 125 *Fungi*. Many trees afforded specimens with splendid inflorescences, some blossoming twice in the year; but others flower principally in March, April and May, and could not be collected in a satisfactory state at a later season. Without having then visited the coast, he had collected no less than 250 kinds of Shells, and a proportionate number of Insects, Reptiles, Crustaceæ, &c.

His reception from the Government (which hitherto had been so jealous of foreigners visiting their country, that I know of no naturalist who had ever penetrated into the interior of the island except

Mr. Cuming) was flattering in the extreme; every facility had been afforded to his researches, and the hospitality of the resident Spaniards was even greater than what he experienced from the same nation in South America. Although Calaguan is deemed the most unhealthy spot in the island, and although Mr. Cuming explored the woods, mountains, marshes and river-banks, frequently exposed to torrents of rain during a whole day, he never suffered an hour from illness, nor experienced a moment's pain, except from the bites of venomous insects. Mr. Cuming's return to England with his collections may shortly be expected

Mr. Gardner, whose intention of visiting the Organ Mountain is noticed at p. 346, vol. ii. of the *Companion to the Botanical Magazine*, writes from his residence of "Fazenda de St. Anna de Paqueta" in that range, at an elevation of 3100 feet above the level of the sea. He says in his letter,—

"I have to acknowledge the receipt of your long and highly welcome letter of the 25th of October, which I had not intended to answer at this time, not expecting an opportunity of despatching my reply. I have however just heard that a vessel is to sail direct for Liverpool in about three days; and a Swiss planter, a very kind friend of mine, whose estate lies about three leagues distant from this Fazenda, having arrived here to-night on his way to the city, and offering to convey anything I may wish to send thither, I sit down to write you a few hurried lines, to inform you that I am in the enjoyment of good health, and busily employed in an excellent botanical field. It will be impossible for me now to dilate on all I have seen and collected upon this mountain range. This information I trust to be able to give on my return to Rio, which will probably take place in about a month, when it is my intention to arrange and pack up all my collections,—a process for which both house-room and paper are wanting here.

"When sailing up the bay to this Fazenda, we passed many little rocky islands, on which I observed a number of *Cacti*; and on my return to the city I hope to take a boat, and spend a day or two in surveying them. Should any new species of the *Cactus* tribe, as I expect, reward my researches, they shall be sent to my generous patron the Duke of Bedford, to whom I regret that there has been no opportunity of forwarding a box of living Palms.

"There are very few Mosses on these mountains, and not many Lichens, but an abundant harvest of Ferns, many of which, I have no doubt, you will find to be new. Several of those I have examined

are undescribed by Sprengel. Among the most remarkable is a very fine *Osmunda*, and a curious bipinnate species, with a habit corresponding to that of *Lygodium*, but the fructification of a *Blechnum*. I have met with a few *Fungi*, but have not collected any. *Agaricus campestris* is very abundant just now on the pastures of this estate.

"Among my recent discoveries are two most beautiful species of *Cattleya*, both of them, I believe, new. A single living plant of each was all I could secure; but I dried and preserved in spirits some of the blossoms.

"Your obliging suggestions as to my future movements have met with my best attention; but I am yet undecided what plan to pursue. Since receiving your letter, my opportunities of obtaining information respecting the route to Goyaz have been very small; and all I have heard is, that the journey would occupy several months, and be attended with heavy expense. From our mutual friend, Dr. Loudon, I had a letter a few days since, containing a most pressing invitation to visit him in that province; and as Von Martius seems to consider the interior from thence as a good botanical field, I feel inclined to proceed thither when quitting Rio, as from the immediate vicinity of Pernambuco much might be obtained, which could not fail to prove acceptable to my subscribers, whether for living or dried plants. After spending four or five months there, it would be time to think of exploring the interior. But although I may remain in Brazil two or three years more, I shall not resign the idea of a trip across the Pampas and Andes to Chili. On all these points you shall hear further when I have the honour to write, along with my Organ Mountain collections.

"Ever since Christmas day I have been residing at this Fazenda; and when my stay is completed, which will be in a month, I hope to send home 400 or 500 species. I now enclose in a box containing insects, two capsules of a species of *Talauma*. This is a grand and handsome tree of frequent occurrence in this vicinity, which bears abundance of large yellowish white, highly fragrant flowers. I arrived just in time to secure a few specimens, which I succeeded, after much trouble, in drying. This spot is at an elevation of 3100 feet above the level of the sea; but the highest peak of the Organ Mountains attains twice that altitude. It has never yet been ascended; but I hope this will not continue to be the case, as the English clergyman at Rio projects an excursion to the summit next week, and kindly permits me to accompany him. We expect to be absent at least three days and two nights; and since many miles of the route lie through a dense virgin forest, where it will be neccs-

sary to cut our way, we shall take four negroes with us, who will also carry provisions, &c. I expect to find many curious things, and only regret that our mode of travelling must preclude the possibility of making large collections. My friends would, I dare say, hardly recognize me in the garb that I assume during these excursions, which consists of only a shirt, thin trowsers, linen shooting-jacket with wide pockets, and a straw hat as broad as the Culross girders used for baking the oat cakes of my native land. Neckcloth and vest are incumbrances here: instead of the former, a string suspends round my neck a large knife; while a cutlass for cutting down trees hangs by my side, and a huge botanical box is strapped to my back. I should also mention that deep Brazilian boots of untanned yellow leather incase my legs, and come up as high as the body. My excursions generally extend to a distance of ten or more miles, as I often ride on a mule; and when I tell you that the woods here are most beautifully adorned with several arborescent species of *Melastomaceæ*, principally of the genus *Lasiandra*, whose deep green foliage and purple blossoms give them the appearance of gigantic Rhododendrons, and which are mingled with large trees of the genus *Cassia*, covered with lovely yellow flowers, you will easily believe that I return home at night loaded with novelties.

“April 5th, 1837.

“GEORGE GARDNER.”

A more recent communication from Mr. Gardner has put us in possession of his journal, written during his residence in the Organ Mountains, which will be given in an early number of our Annals; and of a letter, dated partly at sea and partly on his arrival at Pernambuco, from which we make the following extracts.

“On board Her Majesty's Packet Opossum, between Bahia and Pernambuco, October 6, 1837.

“By the last packet I wrote, stating that I had determined to visit Pernambuco before going south, having been advised not to think of proceeding to Buenos Ayres, in consequence of the present unsettled state of the country between that place and Chili. Several friends, well informed on the point, concurred in this opinion; and while it is with reluctance that I give up my first intention, I still think that twelve months will not be unprofitably spent in the north of Brazil. Pernambuco and the adjoining provinces have been less visited than the rest of this country; and M. Riedel, the botanist attached to M. Lousgdorff's expedition, with whom I have just been conversing, states, that while he has explored all the rest of Brazil, he did not visit Pernambuco, a district, with which though

he is personally unacquainted, he understands to be peculiarly rich in plants.

“I am carrying letters to several of the merchants in Pernambuco, one of whom happens to be a fellow-passenger with us from Bahia. This gentleman informs me that he possesses a country house not far from a large fresh-water lake, eight miles inland from the city, where he has kindly invited me to spend some time. Another of the passengers from Rio is a young Spaniard, who has a large Estancia or farm in the republic of Monte Video, situated about 160 leagues up the Uruguay river. He was educated in England, and is now on his way to visit his father who lives in London. From this individual, with whom I have formed some intimacy, I have received a most hospitable invitation to make use of his house for as long a time as I may remain in that quarter. It is situated only three days journey from the Misiones, where Bonpland resides; and abundance of the *Maté* or Tea plant of Paraguay, (*Ilex Paraguayensis*) is cultivated there. As this gentleman intends to return in less than twelve months, I shall not prolong my stay in the north beyond that period. By this arrangement I hope to reach Buenos Ayres about the beginning of what is the summer season there. I anticipate that this gentleman's kindness will be of the utmost service to me, as he is acquainted, not only with all the Spaniards who possess large farms in that country, but with the greater part of the English also; and in case of his not having returned so soon as my arrival shall take place, he has given me letters to the manager of his estate, who, like himself, is an Anglo-Spaniard, and to some of his relations in Buenos Ayres. He informs me that, however dangerous travelling may be in the country between Buenos Ayres and Mendoza, Cordova and Tucuman, it is perfectly safe to do so in the Banda Oriental and Entre Rios.

“While at Bahia, I saw in one of the numbers of Silliman's North American Journal a drawing and description of the new plant-press* which you propose to me. It is certainly constructed on a much superior plan to any of those now used, and for an individual who is stationary, excels all others; but I incline to think that, for the purpose of travelling, no mode of drying plants is so ready and commo-

* Of the usefulness of this newly-invented plant-press I can speak with confidence, after nearly twelve months' experience in the use of it. It was presented to me by its inventor, Dr. Locke of Cincinnati, state of Ohio, a gentleman who has lately visited England, and who is distinguished for his extensive mechanical knowledge. A figure and description will be offered in a future number of our Journal.—W. J. H.

dious as that afforded by two thin boards the same size as the paper, with strong cross bars, a couple of leathern straps, and a big stone.

"I trust that my second shipment of specimens will have arrived ere you receive this letter. I have yet a few Rio plants to send, most of them collected just before I left that city, and dried during the passage to Bahia, which occupied thirteen days. At the latter place we spent forty-eight hours, during which I made two short botanical excursions, and found several novelties; among them two species of *Eriocaulon*, a yellow-flowered shrubby *Cuphea*, (*C. flava* " Sprengel), *Pistea stratiotes* in flower and seed, *Angelonia hirta* (of Chamisso), and some others which I have not yet had time to examine. Here also were several specimens of what seems to me *Cory-anthes speciosa*, (Hooker), growing on the Mangrove, Cocoa-nut, and other large trees on the Victoria Hill. The country round Bahia is much lower than the neighbourhood of Rio; but its vegetation is ranker and far more luxuriant. The Mangoes, the Jacka (*Artocarpus integrifolia*), the Cocoa-nut and other Palms attain nearly twice the size they do about Rio; and the general Flora is also quite different, the common plants being altogether dissimilar in the two places. On my second botanizing trip I was accompanied by a young man from Glasgow, who has been eight years in a merchant's house here. Though he attended the lectures of the Professor of Botany in that city, he has forgotten all about that science: but his acquaintance rendered him a useful companion. These plants will be sent with the first collection from Pernambuco.

"Before quitting Rio, I again went up to Tejuca, in order to procure, if possible, a few plants of *Oncidium Russellianum*; but though I staid three days and explored every probable spot, I had but little success. The few *Orchidea* that I obtained are sent home, packed with all the skill and care of which I am master, by H.M. ship Blonde, which is expected to make a short passage. * * * * I left two boxes to be forwarded from Rio to Liverpool, containing reptiles and shells: in the former are two birds of the country; one of them the Jacutinga (*Penelope Jacutinga* of Spix), a small monkey and a squirrel. I have also collected several insects; among them another fine species of *Ceotrotus*, which is only found on the small branches of *Carolinea alba*; it is much larger than any of the others.

"GEORGE GARDNER."

Five days after the date of the above letter, i.e. in twenty-five days after quitting Rio, Mr. Gardner reached Pernambuco, where he was kindly welcomed by Dr. Loudon, a gentleman from Glasgow, now resident in that city, who is well known to ourselves, having joined

us in several botanizing parties to the Highlands of Perthshire, and who has paid much attention to the natural history of Brazil. Dr. Loudon assured Mr. Gardner that he thought there would be no difficulty in exploring the interior of the province, by making some cotton or sugar plantation his head-quarters: he offered him all the assistance in his power. As soon as Mr. Gardner should have collected two hundred species, he intended to despatch them home, so that we may soon look for specimens from him.

I may here remark that Mr. Gardner's extensive harvest of Organ Mountain plants have reached London, where such parcels as are addressed to the English and continental subscribers will be taken out by Mr. Hunneman: the rest will be forwarded without delay to Glasgow.

Since the above was written we have had the pleasure of receiving Mr. Gardner's collection of Organ Mountain plants, which will be distributed to the different subscribers with as little delay as possible. It is, as we anticipated, extremely rich in rare and novel species, remarkably well preserved. The number of the fullest sets extends from 301 to 735 phænogamous plants, together with a very fine collection of Ferns, and some good Mosses (which latter are not distributed). Little, comparatively, as is the distance between Rio and the Organ Mountains, yet, on account of the elevation, the vegetation of the latter is considerably different from that of the former place. Among the genera we find two of *Clematis*, a magnificent *Talauma*, two singular species of *Viola* (one *V. balsaminoides*, Gardn. MS.), a *Qualea*, a *Platanthera* (*ciliosa*, Mart.), a *Chorisia* (*speciosa*, St. Hil.), several *Clusia*, or perhaps *Schweiggeria*, St. Hil., *Norantea* (*Brasiliensis*), a *Trigonía*, some fine *Sapindaceæ*, a *Stematosiphon*, Pohl; *Ilex Paraguensis* (!); several *Casearia*; numerous *Leguminosæ*, especially *Cassia*; a *Rubus*, *Cerasus*, *Fuchsia*, many exceedingly beautiful *Melastomaceæ* and *Myrtaceæ*; four Passion-flowers, one with an unusually large and handsome blossom; *Cereus truncatus*, and a new species (*C. Russellianus*, Gardn. MS.); *Hydrocotyle macrophylla*, Pohl; an *Eryngium*, four *Loranthæ*, several *Rubiaceæ*, two Valerians, some very handsome *Lobeliæ* and *Gesneriaceæ*, a *Gaultheria*, a *Vaccinium* and *Andromeda*, numerous and very fine *Compositæ*, particularly a *Baccharis* with large coriaceous cuneate leaves (perhaps *B. platypoda*, Dl.), and a *Mutisa*, *Cybianthus* (*cuneifolius*, Mart.), some *Asclepiadeæ* and *Apocynæ*, a noble *Lisianthus*, *Talbachia* (among *Gentianeæ*), and a magnificent *Prepusa* (of the same family, very different from the *P. montana*, Mart. Nov. Gen. t. 190.), *P. connata*, Gardn. MS.; several *Solanæ*; *Francisceæ*, two species, (one of them the very handsome and little-known *F. hydrangeæformis*, Pohl); two *Virgu-*

laria, a *Cartilleja*, *Peltodon*, *Hyptides*, four *Salvia*, a new *Cyrtandraceous* (?) plant, some singular *Utricularia*, one with a large cordate leaf, several curious species of *Begonia*, *Laurineæ*, a *Rhopala*, an *Aristolochia* (*cymbifera*, Mart.); a caulescent *Dorstenia*, two *Alstrameria*, an *Eriocaulon*, several *Monocotyledoneæ*, and among them no less than fifty-eight species of remarkably well-preserved *Orchideæ*. Seldom have we received a more interesting collection from any country; and we trust that Mr. Gardner's researches in Pernambuco will be rewarded with similar success, and he cannot fail to extend greatly our knowledge of the vegetable riches of Brazil.

We heartily wish that Dr. Schomburgh had been equally fortunate in his travels with Mr. Cuming and Mr. Gardner; but he has had difficulties to contend with of no ordinary character, as will be seen in the following extracts from the letter above-mentioned, dated

"New Amsterdam, Berbice, April 8, 1837.

"I acknowledge with the greatest gratitude your kind letter of November the 12th, 1836, which I received a few days ago on my return to the colony. It evinces in the most flattering terms the interest you take in my proceedings, and stimulates, as it ought to do when I consider the source whence it proceeds, my ardent desire to make myself worthy of that interest. I have to contend with a thousand difficulties; months elapsing, during which I have had no other habitation than an oil-cloth roof and some poles taken from the wood as uprights whereon to sling my hammock. The interior of British Guiana is uninhabited; and while ascending the Berbice, we saw no appearance of human beings from the commencement of December till our return a few days ago. This circumstance alone may show the difficulty which attends the collecting and drying of plants in these regions. Let there be but a hovel which affords shelter and the means for preserving the specimens which have been collected with so much toil, and it is preferable to our late temporary habitations. The greatest traveller of his own time, or of any time, the celebrated Humboldt, found Indian settlements along the wild-east part of his tours; yet I have been for months past in districts where human foot never trod before, and starvation looked us pretty earnestly in the face. There is little doubt that part of the river Berbice has never been visited. No person can be more anxious than myself to send large and good collections of plants to Europe; and during my late expedition everything has been done to fulfil this wish. An assistant was engaged by me, and no opportunity neglected for collecting: still the number of species does

not exceed 220 to 230, exclusive of those which had been previously found on my visit to the Essequibo. It is quite a mistaken idea to conclude that a tropical heat is qualified to dry specimens better than the temperate zone. I can assure you that the contrary is the fact; and I am but too frequently compelled to have recourse to artificial heat, to prevent the plants from spoiling. The dense wood generates moisture at all times, even when the atmosphere appears most clear and serene, which, alas! has been a rare circumstance during my stay in British Guiana, much to the injury of my astronomical observations and botanical stores. During my visit to the Berbice it rained almost daily, and from Christmas to the commencement of April wet weather was incessant. I cannot sufficiently regret that many of the Essequibo plants were in such a bad condition, as I would have made any sacrifice rather than cause dissatisfaction to my subscribers; and to obviate this, I have offered to deduct the amount of such, or to replace them, where practicable, with more perfect samples, in order that botanists may become acquainted with all that I have found, and have no reason for complaint. Of No. 156, to which one of my subscribers objects as being without inflorescence, I may state that I could only find three plants in flower, which were, of course, destined for my first three subscribers; but as the juice of the species itself forms one of the ingredients in the famous *Wonrali* poison, I considered it of sufficient interest to warrant my sending it. No. 157 is of similar interest, being the tree which gives the *Amapaïma* or *Caska preciosa*. Of No. 160 I have only transmitted a portion of the leaves; but Palms must not henceforth be expected from me; for if foliage, spathas and fruit are looked for, how could these be transported in corials? No. 168 has leaves only, no flower; but I considered that the tree which yields the Guiana vegetable milk, and of which the juice is also used by the natives as a varnish, was surely worth sending. I am thankful to the individual who has drawn my attention to these and other Nos.; in some instances I may have been in fault, and I can only repeat my offer that twelve specimens be deducted from my Berbice plants, and that any sample to which a well-founded objection can be made, should be rejected. If cabinet botanists, those who work at home, did but know what trouble it costs to collect plants, especially in the tropics, where Nature seems only to exist in the extremes of either a burning sun or pelting rain, they would be lenient in their judgments respecting those individuals, whose time, labour and expenses it is out of the question to think of repaying. The dense forests of this country are not very productive of those plants

which are most easily collected and preserved; I mean the herbaceous kinds. In these the Savannahs are far richer, while they also yield an equal number of shrubs, &c.

"An abridgement of my reports to the Royal Geographical Society, to which all papers connected with my journey justly belong, has appeared in the Journal of that body. I have, however, protested against any more being published for the present, as my views may change with respect to the country and its productions; and with regard to the character of the natives, it cannot be studied during a six months' journey. My investigations of British Guiana will be concluded in 1838 or 1839; so that if the Almighty spares my health and strength, I hope to have many opportunities before me of increasing my stock of knowledge. I have gone to the expense of engaging a draughtsman, who, under my own inspection, executes drawings of such plants as I may consider interesting; the parts of fructification I delineate myself. Upwards of fifty have been done, many of them new; and I have preserved the inflorescence, and otherwise paid the greatest attention to the faithful representation of the whole plant.

"I am glad to hear that the *Cacti* reached Woburn in good order, though I much doubt that the first I sent was *C. semperangularis*, as the numeral classification, according to the sides which the stem presents, is highly deceptive. M. Otto of Berlin pronounces three of those which I sent from Tortola to be new. Not a *Melocactus* nor *Echinocactus* have I seen since I reached this country; the granitic regions sometimes present a *Cercus* or one of the *Rhipsalidea*, but scarcely anything of the *Cactus* tribe. The islands are doubtless the region of the latter, and these I hope shortly to visit; for, as you are probably aware, Cuba, St. Domingo and Portorico have never been sufficiently investigated, though these are among the largest and most fertile of the West India islands. It is true that Pöppig has been in the first and Bertero in the two latter; but their labours were limited. It is therefore my plan, after returning early in the year 1839, to commence a tour through the islands, from Trinidad to the Bahamas. Have the goodness to tell me candidly whether the collections of plants from these countries would find purchasers. The mountain chain of Cuba, but chiefly that of San Domingo, is yet unexplored.

"Now for the discoveries made during my late expedition. At the head stands a new *Nymphæa*, the most wonderful production I have seen since my botanical researches commenced. I observed it first in the upper regions of the river Berbice; it is generally found where

the river is currentless, the membranaceous leaves being a lively green on the surface and bright crimson beneath, and from 5 to 6½ inches in diameter; the rim is turned up, and from 2 to 6 inches high: the salver-like form of the foliage is most regular, and the flower vies in beauty and singularity with the leaf. It is from a foot to fifteen inches in diameter, of a lovely pink in the middle, and pure white externally. Extensive stretches of the river are covered with this splendid Water Lily, affording so singular an appearance, that when I saw it for the first time, I could have wished my corials had wings, to enable me to ascertain what this beautiful inmate of the waters could be. The sensations of astonishment and delight with which I first surveyed this vegetable wonder are not to be described. I had a faithful drawing taken, and attempted likewise to preserve the leaves and flowers. The former failed utterly; but the blossoms, which are in strong brine, are tolerably well preserved. In a short time you shall hear more of it*.

“My second discovery of interest is a genus of Fern, which I have not previously observed nor seen described in any of the botanical works I possess: it seems to connect the Ferns with the Mosses. Of that curious tribe, the *Balanophora*, I possess a species; but all my

* Probably it is this very Water-Lily to which M. d'Orbigny alludes in his *Voyage dans l'Amérique Méridionale*, when he says, “Le 3 Mars je recommençai ma navigation, et descendant le Paraua, j'arrivai à l'embouchure du petit ruisseau de San Jose, qui forme un immense marais avant de se réunir au fleuve. Là je trouvai une plante qui est peut-être l'un des plus belles d'Amérique. Cette plante, qui paraît appartenir à la famille des *Nymphæacées*, voisine du *Nénuphar* de France, mais dans des dimensions gigantesques, est connue des Guaianais sous le nom de *Yrupé*, qu'elle doit à son séjour habituel et à l'analogie de la forme de ses feuilles avec celles de certains grands plats ou avec la couverture de certains paniers ronds fabriqués dans le pays. Qu'on se figure, sur une étendue de près d'un quart de lieue de long, et de plus de largeur, des feuilles arrondies, flottant à la superficie des eaux, toutes larges d'un à deux mètres, et dont le pourtour est muni de bords relevés perpendiculairement à deux pouces au-dessus de l'eau comme un plat. Ces feuilles, lisses en dessus, se divisent en dessous en une foule de compartimens réguliers, qui forment des côtes très-saillantes, remplies d'un air qui les soutient à la superficie de l'eau. Toute la partie inférieure de la feuille, ainsi que sa tige et ses fleurs, sont couvertes de longues épines. Au milieu de cette vaste plaine, brillent, dans la proportion des feuilles, des fleurs larges de plus d'un pied, de couleur tantôt violarée, tantôt rosée, tantôt blanches, toujours doubles, et exhalant un parfum délicieux. Ces fleurs produisent une espèce de fruit sphérique, qui, dans sa maturité, est gros la moitié de la tête, et plein de graines arrondies très-farineuses; ce qui a fait donner à cette plante le nom de *mais del agua* (mais d'eau) par les Espagnols du pays, qui, à ce qu'il paraît, recueillent ces graines et les font rôtir pour les manger. Je ne pouvais me laisser d'admirer ce colosse des végétaux, dont je recueillis des fleurs, des feuilles et des fruits, et je m'acheminai vers Corientes, où j'arrivai à quatre heures du soir.”

attempts to preserve were fruitless ; it is, however, among my drawings. No less interesting are three new species of *Podostemæa*, of which my first subscribers will receive specimens. I am just occupied in arranging my plants, and must acknowledge with what distress I see the damage which the moisture has caused them, in spite of the chests being tinned inside. Nothing can effectually guard against this evil, and it is needless to complain. I had taken every precaution, and exposed the boxes to the sun whenever there was an opportunity ; though, sad to say ! a sunbeam did not occur above four or five times during the whole two months of my journey.

“ There is little doubt that my steps will next be turned to the mountains near the equator. In my ascent of the Essequibo I may meet with many of the plants I found before, and I shall be obliged by your pointing out to me such among them as you deem worthy to be drawn and described on the spot.

“ I have been very unfortunate with my entomological collections ; they fared worse even than the plants. The wreck of those collected in my last expedition were sent to the Entomological Society, while those which I got together during the Berbice and Conrantine trip were, with the exception of a very few, completely ruined by the corial being swamped ; when, unfortunately, in the agitation of the moment, the box was neglected to be secured. I hope to be less unlucky another time. I had almost forgotten to mention that I have three *Cacti* for Woburn : a number of seeds of Palms, and other plants shall accompany them. It will probably be necessary to send these things *via* Demerara, where I shall be in the commencement of May, as there is no communication from Berbice to Glasgow and Liverpool.

“ ROBERT H. SCHOMBURGH.”

Since the above extracts were penned for publication, much valuable information has been given at the late meeting of the British Association at Liverpool respecting the splendid Nymphæaceous plant discovered by Dr. Schomburgh in the river Berbice. A new genus has been formed of it, which has been dedicated to our young queen. It is the *Nymphæa Victoria* of its discoverer ; *Victoria Regina* of Mr. Gray ; *Victoria regia* of Dr. Lindley, who has done ample justice to Dr. Schomburgh's drawings by having it engraved on an imperial atlas size, at his own expense, and accompanied by a description for private distribution. It detracts nothing from Dr. Schomburgh's merits, if it be really the case, as stated in some of the foreign Journals, that the same plant was also found by Dr. Pöppig in the Amazon river, and named *Euryale Amazonica* ; a genus

from which Professor Lindley has found it necessary to distinguish it. Dr. Schomburgh's letter to the Botanical Society of London respecting this plant, together with an accurate and coloured figure, have also appeared in the 11th number of Sir William Jardine's Magazine of Zoology and Botany.

By the latest account that we have received from this courageous and scientific traveller, dated Demerara, August 28th, 1837, we learn that he was then about to undertake another expedition, and to proceed, without delay, to ascend the Essequibo to William the Fourth's Cataract, which he had reached in 1835-6; thence to continue the survey of that river to its sources, which are considered to be in the supposed mountain chain near the equator. If time and circumstances permit, he will then prosecute his researches to the eastward, return to the junction of Rupernuny in January 1838, and select his tropical winter-quarters (i.e. during the rainy season) at the Brazilian Fort San Joaquim. He then trusts to be enabled, as soon as the dry season sets in again (in August 1838), to start towards the mountain chain where the Orinoco is supposed to have its sources, and to return to Demerara in February or March 1839. In this difficult enterprise we fervently wish him success. Botany has already benefited considerably by his researches, notwithstanding his heavy losses and the difficulties he has had to encounter; and he has sent to his subscribers in England many valuable plants besides the *Victoria* above alluded to, and amongst them specimens and drawings of four species of that highly curious aquatic genus *Lacis* (*Podostemon*, Mirb.), of which further notice will be taken in a future number of our Annals.

Mr. Mathews, the indefatigable Peruvian traveller, has lately despatched another collection of dried plants from the neighbourhood of Moyobamba. The specimens are in beautiful preservation, rich in *Melastomaceæ* and *Compositæ*; but by no means so numerous in species as we could have wished. Mr. Mathews has neglected to number them, which will occasion some delay in the distribution to the Subscribers.

Mr. Tweedie, by whose researches in extra-tropical South America our gardens as well as our herbaria have been so much enriched, has recently performed a journey of some little difficulty to the southward of Buenos Ayres, beyond the Rio Saladillo, to a ridge of hills called Serras de Tandil, a country, as far as we know, never before visited by a botanist. The account with which he has favoured us of this journey will be given in our next number.

BIBLIOGRAPHICAL NOTICES.

Poissons d'Eau douce d'Europe. Par LOUIS AGASSIZ, M.D.

This work is now far advanced, and the publication will be commenced immediately. It will be completed in six livraisons of thirty plates each, giving in the whole work one hundred and eighty for the illustration of species and varieties. The first livraison will be devoted to the *Salmonidæ*, and will contain the species of *Salmon*, *Thymalus*, and *Coregonus* which are at present known to exist in the European waters, accompanied with the requisite details.

Das System der Pilze, Durch Beschreibungen und Abbildungen erläutert, von Dr. Th. Friedr. Ludw. Nees von Esenbeck und A. Henry. 8vo. Bonn, 1837 Erste Abtheilung. 12 Tab.

Much expectation was raised by the announcement of the present work in consequence of the great merit and originality of the *Genera Plantarum Floræ Germaniæ* published under the same auspices, and especially because of the well-known *System der Pilze und Schwämme* of the author's brother. This expectation however has been by no means answered, the figures being with very few exceptions mere copies and illustrations which have been repeatedly before the public, and frequently not the best which might be selected. The genera are often too vague and adopted on slight and insufficient grounds. We think moreover that affinities enunciated by the great Swedish Mycologist have sometimes been rejected with evident loss to systematic harmony. Indeed it is to be regretted that many hints thrown out by Fries, such as the identity of *Nemaspora* and *Libertella*, a fact to the truth of which we can ourselves bear testimony, have been neglected. Though, however, but little addition is made to our knowledge of the structure or affinities of *Fungi* in the present publication, as a compendium of genera and store-house of illustrations it will be of great use to students who have no ready access to the works to which the authors have had recourse. The price is very moderate.

Plantes Cryptogames de France. Par I. B. H. I. Desmazières.
Fasc. XVII. Lille, 1836.

This admirable publication, resembling in its nature that of Bulliard upon the Cryptogamic plants of the Vosges Mountains, is the continuation of one well known to all Cryptogamists, *Plantes Cryptogames du Nord de France*. The new title of the work indeed is a consequence of the great importance to which the more partial one

had arrived, comprising as it does eight hundred species. The specimens are extremely good and in several cases are accompanied by beautiful lithographic sketches, the execution and accuracy of which cannot be too highly praised. Copious notes frequently are subjoined to the species, of which the principal synonyms are indicated. We cannot better show what may be expected from its enlarged scope, than by giving a list of the species which the present Fasciculus contains. It is greatly to be regretted that it is not possible to procure many of the earlier Fasciculi, of which we hope that the excellent author will be induced to give a second edition. Those marked with an asterisk are accompanied by figures. The price of each fasciculus at Lille is 10 francs.

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|--------------------------------------------------|-----------------------------------------------------|
| *801. <i>Frustulia major</i> , Kutz. | 825. <i>Racodium rubiginosum</i> , (var.) Fr. |
| *802. <i>Closterium lunula</i> , Nitz. | 826. <i>Peziza brunneo-atra</i> , Desm. |
| *803. ——— <i>lamellosum</i> , De Bréb. | 827. ——— <i>Tami</i> , Lamy. |
| *804. <i>Micrasterias denticulata</i> , De Bréb. | 828. ——— <i>culmicola</i> , Desm. |
| *805. <i>Anabaina Brebissonii</i> , Desm. | 829. ——— <i>insidiosus</i> , Desm. |
| 806. <i>Corynephora marina</i> , Ag. | 830. <i>Vibrissia truncorum</i> , Fr. |
| 807. <i>Rivularia nitida</i> , Ag. | *831. <i>Agaricus radians</i> , Desm. |
| 808. ——— <i>plana</i> , Harv. in Hook. Br. Fl. | (<i>Lycoperdon radiatum</i> , Sow.) |
| 809. <i>Desmidium mucosum</i> , De Bréb. | 832. <i>Uredo utriculosa</i> , Duby. |
| *810. <i>Gaillonella varians</i> , Desm. | 833. ——— <i>Artemisia</i> , Chev. |
| *811. ——— ? <i>subflexilis</i> , Desm. | 834. ——— <i>Umbellatarum</i> , Chev. |
| 812. <i>Asperococcus rugosus</i> , Lam. | 835. ——— <i>cylindrica</i> , Strauss. |
| 813. ——— <i>bulbosus</i> , Lam. | 836. ——— <i>epitea</i> , Kz. |
| 814. <i>Dumontia incrassata</i> , Lam. | 837. ——— <i>Tropæoli</i> , Desm. |
| 815. ——— <i>capillaris</i> , Crouan. | 838. <i>Sphæria salicina</i> , Pers. |
| 816. <i>Delesseria ruscifolia</i> , Lam. | 839. ——— <i>Lamyi</i> , Desm. |
| 817. ——— <i>sinuosa</i> , Lam. | 840. ——— <i>Laburni</i> , Pers. |
| 818. ——— <i>arborescens</i> , De La Pylaie. | 841. ——— <i>Berberidis</i> , Pers. |
| 819. ——— <i>sanguinea</i> , Lam. | 842. ——— <i>atrovirens</i> , æ. A. & S. |
| 820. <i>Laminaria bulbosa</i> , Lam. | 843. <i>Phoma Phaseoli</i> , Desm. |
| 821. ——— <i>saccharina</i> (junior), Crouan. | 844. <i>Lecidea aromatica</i> , Turn. |
| 822. <i>Cystoseira granulata</i> , Ag. | 845. ——— <i>albo-cærulescens</i> , Ach. |
| 823. ——— <i>barbata</i> , Ag. | 846. ——— <i>speirea</i> , β. <i>cretacea</i> , Ach. |
| 824. ——— <i>ericoides</i> , Ag. | 847. ——— <i>anomala</i> , Ach. |
| | 848. ——— <i>erythrocarpia</i> , Ach. |
| | 849. ——— <i>subcarnea</i> , Ach. |
| | 850. ——— <i>canescens</i> , Ach. |

Magazin de Zoologie, Journal destiné à faciliter aux Zoologistes de tous les pays, les moyens de publier leur Travaux, et les espèces nouvelles ou peu connues qu'ils possèdent. Par F. E. Guérin-Meneville. 8vo. Paris, Septième année, Livs. 3. 4.

Livraison 3^{me}, 7^{me} année.

1.—Notice sur le groupe des *Tangaras Rhamphocèles*, et sur toutes

les espèces qui le composent, et description d'une nouvelle espèce de cette division. Par M. De Lafresnaye.—The author makes out six species, including his undescribed one, to be now known in this limited South American genus. The new species figured under the name of *M. dimidiatus* seems to be identical with the *R. melanogaster* of Swain. described in Lardner's 'Animals in Menageries,' p. 359, and if so the latter name must give way. It is said by Lafresnaye to be brought from the southern part of Mexico, and is entirely of a brilliant scarlet, inclining to rich purple on the head and neck, and with the wings, tail, and centre of the belly deep black. Mr. Swainson gives Peru as the locality for his species.—2. Continuation of the "*Synopsis Avium, ab Alcide D'Orbigny.*"—3. Continuation of "*Voyage de la Favorite,*" *Classe III. Reptiles*, illustrated by five plates.

Livraison 4^{me}, 7^{me} année.

1. *Documents pour servir à l'histoire naturelle des Cephalopodes cryptodibranches*, par M. Rang. These "documents" are not completed; what we have published commence a series of notes on the genus *Argonauta*, and are accompanied by three figures of the *A. Argo* in different positions in the shell.—2. *Description de trois nouvelles espèces de Paludines fossiles*, par M. Charles D'Orbigny, with figures.—3. *Forficula parallela*, Westwood. A native of Mexico. Figured.—4. *Helops Lanipes*, Fabricius; description and figures of the states of the imperfect insect.—5. *Insectorum nonnullorum exoticorum e familia Cynipidarum descriptiones*, auctore J. O. Westwood. *Leiopteron peras*, West. *Italia scalpellator*, West. Shortly described. The two first figured in outline.—6. Genus *Conura*, Spinola. *Conura flavescens*, shortly described and figured.—7. *Niphicera*, Latreille. *X. Cater-naultii*, Leisthamel, n. s., described by Baron Leisthamel, and illustrated with a coloured figure; and *X. Pierrettii*, described by Blanchard, and also illustrated by a coloured engraving: both are considered new to science, and of the last the describer is aware of only a single species. The first is a native of Cayenne, the latter of Brazil.

PROCEEDINGS OF LEARNED SOCIETIES.

LINNÆAN SOCIETY.

Jan. 16, 1838.—Mr. Forster, V. P., in the Chair.

Read a Paper on the Structure of *Cuscuta europæa*. By CHARLES C. BABINGTON, Esq., M.A., F.L.S.

The descriptions and figures of this plant given in the various works on our native plants are very imperfect. Mr. Babington's

observations on recent specimens gathered in Sussex, in company with Mr. Bower, confirm the statement of Mr. Brown as to the existence of scales in the tube of the corolla, a fact denied both by Sir J. E. Smith and Sir W. Hooker, who, however, appear to have examined dried specimens. These scales are transparent, closely pressed to the corolla, and very minute, so that they are easily overlooked, even in recent specimens, and in dried ones it is scarcely possible to discern them. They are bicuspidate, erect, and situated at the inner base of the filaments, which they partially inclose. Their form and position appear to have been first accurately described by Raymond, as recorded by Römer and Schultes. Reichenbach describes and figures them as palmate, and as situated at the base of the tube, so that it is probable his plant is different from ours, as Mr. Babington suggests. The nature of these scales is not well understood: by most botanists they are regarded as a vortical abortive stamens, and by Reichenbach as petals; but their situation always within the stamens, and opposite to them, appears to refute both these opinions. Analogous scales occur in *Hydrophyllææ*. The following characters are given by Mr. Babington of our British species:

C. europæa, florum glomerulis bracteatis sessilibus, squamis bifidis erectis, tubo corollæ per anthesin cylindrico, fructiferæ ventricosæ, adpressis.

C. Epithymum, florum glomerulis bracteatis sessilibus, squamis palmatis conniventibus, tubo corollæ cylindrico limbo campanulato.

A third species of this curious genus has very lately been added to our Flora by Mr. J. E. Bowman, F.L.S., namely the *C. Epilinum* of Weihe. (*Reich. Ic. t. 500. f. 693.*)

Feb. 6, Mr. Forster, V.P., in the Chair.—Mr. Newman, F.L.S., exhibited a specimen of a variety of *Nephrodium dilatatum* gathered in Ireland, and remarkable for the great size of its sori.

Mr. Henry Doubleday exhibited a specimen of *Lavatera Olbia*, from the banks of a road lately cut through Epping Forest, where the plant was growing in abundance, and apparently naturalized.

Read the commencement of a paper by John Hogg, Esq., M.A., F.L.S., on the classification of Amphibia.

ZOOLOGICAL SOCIETY.

September 12th,—Dr. Bostock in the Chair.—Some observations were made by Dr. Andrew Smith, Corresp. Member, on the necessity for a revision of the groups included in the Linnæan genus *Squalus*.

Dr. Smith commenced with stating that in the course of his examination of the Sharks which he had obtained while at the Cape,

he found that although they could all readily be referred to the genus *Squalus*, as defined by Linnæus, yet there were many forms among them which would not admit of being placed in any of the subdivisions proposed by Cuvier. This led him to perceive the necessity of either altogether remodelling Cuvier's groups, or of establishing additional ones for the reception of the new species. After mature consideration, he determined upon the adoption of the latter course, finding the new forms so distinct and numerous that they could not with propriety be included in any divisions which only ranked as sub-genera.

Dr. Smith stated that he could not attempt to indicate the higher groups of the family of *Squalidae*, but he was satisfied that all the sub-genera of Cuvier would receive such alterations and additions as would raise them to the rank of sub-families. In the very first sub-genus *Scyllium*, he had detected nine distinct minor groups, most of which included several well-marked species. Since fixing upon names for these groups, he had learned that several of them had been described as genera about a month previously by Prof. Muller and Dr. Henle of Berlin, and he had consequently adopted their nomenclature in preference to the terms under which it was his intention to have characterized them, with only this difference, that he regarded these divisions as sub-genera rather than genera.

Dr. Smith enumerated the sections above referred to of the genus *Scyllium* as follows :

1. *Scyllium*, restricted, includes four species, *Scyl. stellare*, Linn., *Squalus Canicula*, Bloch, *Scyllium capense*, Smith, *Scyl. bivism*, id.

2. *Catulus*, Willoughby. (three species,) *Squalus Canicula*, Linn., *Scyl. marmoratum*, Bennett, *Catulus Edwardii*, Smith.

3. *Poroderma*, Smith, (four species, all found in the Cape seas,) *Scyllium Africanum*, Cuv., *Poroderma pantherinum*, Smith, *Por. submaculatum*, id. *Por. variegatum*, id.

4. *Ginglymostoma*, Muller and Henle. (one species) *Squalus Gata*, Garra.

5. *Chiloscyllium*, Müller and Henle, (two species) *Scyllium plagiosum*, Bennett, *Le Squal dentelé*, Laccp.

6. *Stegostoma*, Müller and Henle, (two species) *Squalus fasciatus*, Bloch, *Squal. maculatus*, id.

7. *Hemiscyllium*, Müller and Henle, (one species) *Squalus ocellatus*, Bloch.

8. *Chrossorhinus*, Muller and Henle, (one species) *Squalus lobatus*, described in Phillips's Voyage to Botany Bay.

9. *Pristiurus*, Bonaparte, (one species) *Scyllium melanostomum*, Bonap.

Some drawings were exhibited by Dr. Smith, of the forms presented by the teeth of the species composing several of the above sections, and he remarked that on a future evening it was his intention to lay before the Society some further observations upon other groups of the cartilaginous fishes.

Professor Müller of Berlin being present confirmed the views entertained by Dr. Smith as to the number of divisions which might properly be made of the family *Scyllium*, several of which he had already published, as mentioned by Dr. Smith. As to the rank which these groups should hold in a systematic arrangement, he considered this a point upon which we are hardly in possession of sufficient evidence to justify a decided opinion.

ROYAL SOCIETY OF EDINBURGH.

Dec. 4, 1837.—Sir Thomas Brisbane, Bart., President, in the Chair.

On the Food of the Vendace, Herring, and Salmon. By JOHN STARK.

1. *Food of the Vendace (Coregonus Maranula, Jardine).* The author observed, that fishes in lakes, and feeding on animal food, must necessarily subsist on the small aquatic animals found in these lakes; that there is no reasonable analogy between the vendace and herring, because they live in different mediums, the one in salt the other in fresh water, and that their food cannot therefore be the same, none of the animals upon which fishes feed being common to both; that writers on Natural History state the animalcules which are found in the stomach of the vendace, and other minute animals found in lakes, to be the food of freshwater fishes generally; and that Leuwenhoek had even figured the identical animal lately found in the stomach of the vendace more than 130 years before, stating that it and the other minute animals in similar localities formed the food of the larger fishes.

2. *Food of the Herring (Clupea Harengus, Linn.).* The author stated that the food of the herring was better known than that of any other fish: that the food of the herring was, in particular, known to and described from personal observation by Paul Neucrantz previous to the year 1654, by Leuwenhoek in 1696, by Muller in 1785, by Bloch about the same period, by Fabricius in 1781, by Latreille and Lacépède in 1798, by the Rev. Dr. Scoresby in 1820, by Pennant and others, and in fact is mentioned by every writer who treats of the natural history of fishes; and that what had been stated by all writers on

the subject, is corroborated by the examination of the stomach and intestinal canal of the herring, and the stomachs laid on the table of the Society.

3. *Food and Reproduction of the Salmon (Salmo Salar, Linn.)*. The author stated on this head what had been remarked by the most esteemed authors on natural history to form the food of the salmon ; and exhibited preparations by Dr. Pownell confirming the statements of these writers. He next noticed the valuable evidence taken before a Committee of Parliament in 1824-25, regarding the food and natural history of the salmon, which also corroborated the statements of systematic writers ; and remarked, that when these fishes prey upon animals in roc, such as the *Asterias*, the ova often remain in the stomach and intestinal canal after the other portions of the food are wholly digested. He next gave an abstract of the evidence laid before the Parliamentary Committee as to the periods of the ascent of the salmon in the different rivers for the purpose of spawning and the descent of the fry to the sea ; and pointed out the experiments made on the development of the ova by Mr. John Hogarth, jun , in the Appendix to the Report of the Committee, and those detailed by Mr. Schonberg in Sir David Brewster's Journal of Science.

Dec. 18, 1837.—Dr. Hope, Vice-President, in the Chair.

Experiments on the Growth of the Fry of the Salmon, from the exclusion of the Ova to the age of seven months. By Mr. JOHN SHAW. Communicated by Mr. Stark.

The author of this paper had formerly made experiments on the growth of the salmon fry, by procuring spawn from the river bed where it had been deposited by the salmon. Not considering these experiments, however, as entirely unobjectionable, he procured two fishes from the river Nith in the act of spawning ; and having expressed the ova of the female in a convenient place, the milt of the male fish was made to impregnate them as nearly as possible in imitation of the natural process. The ova were then placed in ponds prepared for the purpose, and so arranged as to exclude all chances of error as to the species or the nature of the progeny. The ponds were two in number ; one twenty-five by eighteen feet, the other fifty by thirty feet, and two feet deep. The bottom was thickly imbedded with gravel ; and a small stream of spring water entered the ponds at the upper corner, and escaped by an opening at the other end. Both apertures were covered by a wire grating. The ova in one experiment were deposited on the 20th of January 1737. On the 10th of March (fifty days after deposition) the embryo fish were visible.

On the 27th of April (ninety-eight days after deposition) they were excluded from the egg. Specimens were exhibited of thirty days old, taken on the 26th of May, measuring nearly an inch in length, and the ovum still adherent. On the 27th of June, at two months old, the fry measured an inch and a half in length; and on the 27th of October, at six months old, a specimen exhibited measured about four inches in length. The temperature of the pond and of the air was noted at the periods of examination. Another experiment in a different pond afforded analogous results. Mr. Shaw is of opinion, from what he has observed in these and former experiments, that the young salmon remains in its native stream for two years after being hatched; and that the Parr, or what is termed the Parr in his neighbourhood, is the young of the salmon.

ENTOMOLOGICAL SOCIETY.

Extract from an Address on the Fourth Anniversary, January 22nd,
 *1828. By JAMES FRANCIS STEPHENS, F.L.S., President.

“With regard to our *Collection of Insects*, it is with unusual satisfaction I announce that, from the prosperous state of our finances, as you have heard from the report of our worthy Treasurer—(appended at the end)—we shall be enabled to command the services of a paid assistant to those gentlemen who have so kindly and so liberally undertaken gratuitously to superintend its arrangement; and as we are now in possession of several excellent cabinets, I hope before the recurrence of another anniversary, the entire collection will be so far arranged as to be available to the student; for I speak advisedly when I add, that several individuals have hitherto declined joining our Society, and one has actually tendered his resignation, in consequence of our collection, extensive though it is, remaining in an unarranged condition. I need not, therefore, impress upon our valuable curators the boon they will confer upon the Society, by expediting as much as in their power the labours they have so handsomely undertaken to perform; though at the same time, knowing the various difficulties they have to encounter, we cannot expect their progress will be very rapid, from the very limited time they can afford to devote to the subject; at all events, I feel that the thanks of the Society are justly due to them for the exertions they have already made in furtherance of the task voluntarily imposed upon themselves, and, let us hope, that they will merit a reiteration of the same from their increased exertions on our behalf during the present year.

“The design and objects of this Society have already been re-

peatedly alluded to by my predecessors; nevertheless, I cannot avoid reverting to the fact, that one of its immediate, and, as it appears to me, most momentous objects, is the *publication* of the labours of its members; and I am, therefore, happy to announce that the Fourth Part of our Transactions is now upon the table ready for distribution, and, I feel assured, that several of the papers will reflect great credit upon the writers, from their *practical utility*, and tend considerably to advance the views contemplated by the Society.

“ Amongst the latter, the Prize Essays established by the Society may be referred to for their *practical importance* to the Agriculturist; the Essay proposed for the past year, was an investigation into the habits, &c. of the “ Nigger,” or black caterpillar of the Turnip-Fly (*Athalia Centifolia*), towards the prosecution of which the Agricultural Society of Saffron Walden joined us, by proposing an additional Five Guineas for the successful Essayist.

“ Surrounded as I am by individuals fully competent to judge of the vast and almost boundless extent of the subjects comprehended within the scope of the Society's investigation, it may not be thought useless to suggest to them the adoption of the most simple methods of carrying their inquiries forward. Most of you, doubtless, have experienced, at one time or other, the vexatious loss of time consequent upon being compelled to wade through voluminous works for the purpose of ascertaining whether any account or description of the insect, then under your investigation, was therein contained, and after the most laborious research have been frequently disappointed in your endeavours to extract the wished-for information, arising from the diffused and miscellaneous character of such publications; and, as I trust that our Transactions will eventually become voluminous, would it not be advisable for the working members of the Society to confine their labours, as far as practicable, to *groups*, in preference to the mere description of new and isolated *species*? thereby gradually laying the foundation of a valuable series of Essays, by preparing a succession of monographs of such groups of insects as are but little known, and of which the descriptions, so far as they have appeared, lie scattered over numerous bulky volumes. I would, however, except from this rule all notices or descriptions of new species, regarding which any important fact of œconomy, physiology, structure, &c., may present itself; but in this case, as well as in the previous instances of monographs, I would recommend that an occasional abstract of the species described in the preceding volumes of our Transactions should be prepared in an arranged form as an index to their contents, and as a guide to the student, and that

this arranged index should be occasionally continued, and the previous abstracts incorporated : indeed the necessity of rendering the results of our exertions accessible cannot be too much insisted upon. The astounding number of works, relating to Entomology, enumerated in Percheron's *Bibliographie Entomologique*, is sufficient evidence of the drudgery required by the investigator into the ascertainment of new species, &c. ; but numerous as are the works recorded by that author, there appear to be so many serious omissions, that I cannot do better than reiterate the suggestion of my predecessor, that a Manuscript Catalogue should be formed as an Addendum to the above-mentioned work.

“ With respect to the various papers which have been presented to the Society, and have contributed towards our instruction or entertainment at our meetings during the past year, I have no particular remarks to make, than to observe, in general terms, that the most valuable of them will *shortly* appear in your Transactions; and I have great satisfaction in saying, it is the intention of your Council to publish our fasciculi at shorter intervals than has hitherto been the practice.”

BOTANICAL SOCIETY OF LONDON.

Extract from the First Annual Report, read 29th November, 1837 ; President, J. E. GRAY, F.R.S.—“The number of British plants received amount to 4819 specimens, including ferns ; 767 species, including 1313 specimens, have been arranged in the Herbarium, according to the system of De Candolle. The remaining 3506 duplicates, including 515 species, will be distributed to those persons who have favoured the Curator with lists of desiderata for that purpose. This distribution will take place under the direction of the Council in the months of December and January every year, when each member will receive such of his desiderata as may be contained among the duplicates in the Herbarium in proportion to his contributions : those gentlemen who have not contributed to the Herbarium receiving their duplicates after the distribution to the contributors has taken place. The Council beg also to inform the members, that in order to afford every facility for examining the Herbarium and Library, the rooms of the Society will be open one hour and a half previous to the ordinary meetings of the Society, when the Curator and Secretary will attend to render any assistance that may be required, and to circulate the books. In addition to the extensive and valuable collection of British plants, the Council beg to announce the receipt of a large collection of French plants, supposed to be a por-

tion of the Herbarium of Jean Jacques Rousseau, together with some plants from Mahon, Minorca, presented by the Secretary. Another collection of foreign plants from America, collected by the officers of the Hudson's Bay Company, has been presented by Joseph Freeman, Esq. Also specimens of *Lycopodium Circinnatum*, from the President, sent by Dr. Forbes, F.R.S., of Chichester. Specimens of three new British plants have been received, viz. *Claytonia Alsinoides*, from Mr. W. Baxter of Oxford; also a moss new to Britain, *Cinclidium Stygium*, from Mr. Leyland of Halifax; and specimens, of which there are many duplicates, of *Spartina Alternifolia*, from Itchin Ferry, Southampton, presented by Dr. Macreight, V. P. The Society have also received from Mr. R. H. Schomburgh, now travelling in British Guiana, papers accompanied with drawings on the two following interesting plants, which were read before the Society, viz. *Victoria Regina* and *Loranthus Smythii*. Also donations of seeds from the Cape of Good Hope, presented by M. Schmidt.

"On the first Friday in March the Curator, Daniel Cooper, Esq., will commence a course of Lectures on the Practical Part of Botany, which will be continued every night of meeting one hour previous to the chair being taken."

MISCELLANEOUS.

DESCRIPTION OF A NEW TRILOBITE.

CALYMENE ROWII, Green.—The outline of this fossil as it lies upon the rock presents a very regular oval figure. The buckler and the body are a good deal elevated, and measure longitudinally nearly an inch and two thirds.

The *buckler* is lunate, and is edged round its whole border with a little groove or channel. Its *front* or middle lobe is elevated above the cheeks, is rounded at its anterior part, and gradually enlarges as it approaches the middle lobe of the abdomen. There are no tubercles or folds upon it, but its posterior angles are so truncated as to form a subtriangular protuberance on each side of the commencement of the vertebral column. The *cheeks* are shaped like spherical triangles, and seem from our specimen to have projected on each side to the fourth articulation of the abdomen. The *oculiferous tubercles* are large and lunate; they are placed close to the front, and seem almost to form a part of it; they are situated just before the protuberances above mentioned.

The *abdomen* and *tail* can readily be distinguished. There are twenty-three articulations in both. The middle lobe is very promi-

ment, is separated from the lateral ones on each side by a deep channel, and gradually and regularly tapers to its termination, which is near the end of the body. The *lateral lobes* are rounded. The *costal arches* of the abdomen have a furrow scooped out of their upper surface, and their outward extremities terminate in obtuse points, between which there is a raised line. The *caudal arches* are not grooved, but there is a faint impressed line running along their upper surface, which is slightly bifurcated at their termination.

This beautiful and highly interesting trilobite was found by Mr. George L. Le Row, of Poughkeepsie, N. Y., to whose kindness I owe this opportunity of describing it. The specific name is given in compliment to the discoverer. There is a strong analogy in some leading particulars between this species and our *C. Diops*. Professor Dalman's *C. concinna* represented on his first plate, fig. 5, *a*, *b*, and *c*, comes very near it, but there are many marked differences between them. It was found imbedded in a layer of soft argillite, slightly ferruginous, and of such is the fossil composed. The strata in which it was found was filled with *Orthocæra* and numerous other fossils. Immediately under this layer is another of argillite, of harder texture and darker colour, and free from petrifications.—Dr. Green, in *Silliman's American Journal of Science*, No. 2. Jan. 1838.

FOSSIL ARGONAUTA.

Mr. Sismonda, jun., of Turin, has discovered near Conigliano, in the blue marls of the super-cretaceous deposit, the *Argonauta Argo*, Linn., a genus which does not appear to have been hitherto found in a fossil state.—*Ann. des Sci. Nat.*, Août 1837.

GENERATION OF PTEROPTUS VESPERTILIONIS.

Chr. L. Nitsch has lately ascertained that the *Pteroptus vespertilionis*, Dufour, (*Gamasus vespertilionis*, Lat.) is by no means oviparous, (as Göze supposed,) but viviparous; that it bears but one young at a time; that this comes into the world with eight feet, but the younger foetus or embryo has only six feet, and therefore undergoes a metamorphosis in the body of the mother, which in many other, also parasitical genera of Acari, first takes place after the birth, or after quitting the egg. The six-footed embryos are soft, milky white, and quite without hair. The feet and palpi are non-articulated, the former terminating conically and abruptly, without any claws. The feet and palpi in the 8-footed foetus exhibit evident articulations, amounting in the former to seven; the claws are present. The colour is yellowish white.—*Wiegmann's Archiv*, Part IV. 1837.

ANNALS OF NATURAL HISTORY.

VIII.—*On the Fructification of the Pileate and Clavate Tribes of Hymenomycetous Fungi.* By the Rev. M. J. BERKELEY, M.A., F.L.S.

IN the sixth volume of the New Series of the *Annales des Sciences Naturelles*, p. 336, in the Number dated Dec. 1836, but not published till some months later, M. Montagne has the following observation under *Gomphus rutilus*: “ Elle m’a donné occasion de faire des observations précieuses pour le mémoire que j’ai eu l’honneur de lire devant l’Académie des Sciences sous le titre de Recherches anatomiques et physiologiques sur l’hyménium des Agaricinées.” This attracted special notice, as my attention had been directed for some time to the real structure of the hymenium in Agarics, which I had reason to believe had been altogether misunderstood. It appeared highly probable that the result of his investigations was in substance the same as that to which I had myself arrived, from a series of observations on the supposed asci of Agarics; but at the same time I felt that, if this were the case, it would not be useless, in a matter of such difficulty and obscurity, to publish an account of my own perfectly independent researches. I was however desirous before doing so of following up the matter in as many genera as could be procured of Pileate Fungi, and this led to an examination of the Clavate group also, which, from their very close affinity, I could scarcely believe, notwithstanding the received notions of mycologists, to differ essentially in organization. The facts which presented themselves appeared to me not only interesting from their novelty, but of such importance, that I considered it expedient, as far as possible, to trace the history of the present state of knowledge on the point in question, and it was curious to observe that the earlier notions were the more correct.

Since almost the whole of my observations were made, and the greater part of the present memoir drawn up, I have had
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the good fortune to meet with the *Comptes Rendus des Séances de l'Académie* for the Session January 2, 1837, in which there is a report of M. Montagne's paper by MM. Mirbel, Turpin and Richard, from which it appears that there is a great difference between our observations, though at the same time there is a strong confirmation in what is there adduced of the correctness of the views which are now offered. He understands the evolution of the reproductive bodies in a very different way from myself, though it is quite clear that his observations, as far as they go, are substantially the same as my own, and he appears to have altogether overlooked the very important fact that their arrangement is very generally quaternary as in *Coprini*. His observations appear not to have been extended at all to the Clavate Fungi.

I should perhaps feel more diffidence with respect to my own correctness, on finding such discrepancy in the account given by so eminent an observer as M. Montagne, if I were not in the first place sure that the facts as stated by him are such as will eventually lead him to similar results with my own, and were I not in the second place supported by the testimony of accurate observers, to whom I have communicated the facts, who have seen precisely the same appearances as myself. When once any notion is very generally received and supported by high authority, it is very difficult even in matters of much less obscurity than minute microscopic analysis where there is so much room for the exercise of imagination, to divest oneself entirely of preconceptions. A fortunate moment sometimes puts one in possession of truths which it would have taken a long and tedious process to arrive at in the ordinary routine of investigation. Nothing can more clearly show that we are both in the right track, than the fact that while M. Montagne has been led to see the perfect analogy between the spores of *Botrytis Bassiana* and the reproductive bodies of Agarics, I have myself recognised the same fact as regards the spores of *Botrytis curta*, a species nearly allied to *Botrytis parasitica*, an analogy which would by no means be suspected.

In 1729, Micheli* first, I believe, attempted an analysis of

* *Nova Genera Plantarum juxta Tournefortii methodum disposita*. Florentiæ, 1729.

the hymenium of pileate Fungi. Indeed Dillenius* so late as 1719 denies that Fungi possess seeds. At tab. 65 B is a representation of a portion of a gill of some dimidiate Agaric referred to his genus *Agaricum*, which consists of lateral *Polypori*, *Agarici*, *Hydna*, &c. It is fringed with cylindrical shortly pedicellate bodies which are called flowers, and separate seeds at D. "Harum flores," he says, p. 117, "sunt apetalii monostemonones, seu unico filamento constantes, steriles, et nudi, nempe calyce, pistillo, atque staminibus destituti, et vel in lacunarum vel in foraminulorum ore nascentes. Semina autem rotunda vel subrotunda." The flowers are evidently cells fringing the margin of the gills or cavities of the hymenium. The seeds are said to be hid in tubes as in *Fistulina*, or to adhere to the external processes as in *Hydnum*. Again at tab. 68, under the genus *Suillus*, which is the modern *Boletus*, are representations of similar bodies; and at O the so-called seeds are very clearly shown *in situ* adhering to the interior surface of the tube with their longer axis perpendicular to it, which, as far as it goes, is perfectly consistent with the facts I have to bring forward.

The same appearances are described in his genus *Polyporus*, consisting of central-stemmed *Polypori*. In *Erinaceus*, which consists of mesopous *Hydna*, the seeds are said to *adhere* to the prickles. In his genus *Fungus* (*Agaricus* of authors) the same things are described p. 133, with slight differences: "In earundem lamellarum margine nascuntur flores apetalii, nudi, constantes ex mero filamento cylindrico, in nonnullis speciebus solitario seu inter se distincto, in aliis vero in massam seu floccum digesto. In *superficie* autem utriusque partis supradictarum laminarum undique nascuntur semina rotunda vel subrotunda et minutissima, in aliquibus sigillatim dispersa, in aliis quaterna sibi contigua." He also describes and figures the utricle of the *Coprini*, whose office he believes to be the prevention of the gills coming in contact. The flowers are here again very evidently short single hair-like cells, or fascicles of them. No definite information is given with respect to the fructification of the clavate Hymenomycetes.

On the whole then Micheli clearly considered the seeds as

* Appendix ad Catalogum Plantarum sponte circa Gissam nascentium, 1719, p. 72.

superficial, and he described the quaternate arrangement and utricles in the *Coprini*.

In 1753 the same things were confirmed by Gleditsch*, his figures being copied from those of Micheli. He professes, however, p. 5, not to have servilely copied Micheli, but to have certified himself of his correctness.

In 1762 Schmidel† described the gills of *Agaricus comatus* as furnished with seeds, “qui utrumque parietem dense vestiunt.” Analyses of certain *Clavariæ* are also given, which, though very incomplete, are as far as they go correct.

In 1763 Gleichen‡ figured a portion of the gill of an agaric with an appearance described as “vaisseaux de poussière avec leurs filets noires et tachetés de blanc,” which must have arisen from optical deception. The so-called “filets” are of considerable size, swelling upwards and supporting lobed masses of naked reproductive bodies. He appears to consider these imaginary bodies as the same with the utricles described by Micheli and Gleditsch in *Coprini*, who, he says, have well observed them; but Schaeffer§ denies their existence. The reproductive bodies themselves are well figured.

In 1780 Müller|| gave an excellent figure of a portion of a gill of *Ag. comatus*, in which not only is the quaternate arrangement of the spores very well expressed, but towards the edge they are accurately represented as naked and supported by little peduncles.

In 1783 Bergeret¶ noticed the large utricles in *Ag. micaeus* (*Ag. farinaceus*, Berg.), but appears to have been unacquainted with the quaternary arrangement.

In 1784 Hedwig published his *Theoria Plantarum Cryptogamicarum*, a second edition of which appeared in 1790. In this four plates are devoted to pilcate Fungi. At tab. 41, fig 2, the gills of some *Cortinaria*, and at tab. 42, fig. 2, a prickle of *Hydnum imbricatum*, are represented as covered with project-

* *Methodus Fungorum*, &c. Berolini, 1753.

† *Icones Plantarum et analyses partium*. Nuremberg, 1762.

‡ *Supplément d'observations mêlées*, tab. 4, in *Observations Microscopiques*. Nuremberg, 1763.

§ *Vorläufige Beobachtungen der Schwämme um Regensburg*. Regensburg, 1759.

|| *Flora Danica*. Fasc. XIV. Hafniæ.

¶ *Bergeret, Pytonomatotechnie Universelle*. Paris, 1783.

ing spiculæ, but without any reproductive bodies. The spores which had fallen on the veil were considered by him as male organs, an error pointed out by Bulliard in 1791.

In 1791 Bulliard* distinguished two different kinds of bodies in the hymenium of *Agarici*, *Boleti*, and *Thelephoræ* by the name of spermatic vessels and seeds. The utricles on the gills of *Coprini* are an instance of the first; and though analogous bodies, as will be seen hereafter, exist in *Boleti*, &c., he appears often to have called the true reproductive bodies by the same name, and sometimes perhaps the fringes noticed by Micheli. The true sporidia, or more properly speaking spores, he figures as superficial, tab. 1. fig. iii. 10. 11, tab. 2. fig. xi. p; and at fig. ix. k the spores of *Auricularia phylacteris* are represented (under the name however of spermatic vessels) as seated four together upon a common peduncle. The same structure is also given under *Auricularia caryophyllea*, tab. 483. 6 & 7. S. Indeed, he says, "Les champignons dont nous venons de parler ont presque toutes leurs graines insérées à des filets extrêmement courts." (p. 50.) Such are represented tab. 2. fig. 1. F. G. In fig. vii. and viii., which represent the structure of *Boletus* and *Fistulina*, superficial grains are figured, which in the former case probably consist partly of the spores and spore-bearing cells, in the latter possibly of the spores only. No analysis is given of *Clavaria*. The remarks about spermatic vessels in that genus apply principally to *Sphæria* and *Hypoxydon*.

In 1796 Persoon† described the quaternary arrangement of the reproductive bodies of *Corticium cæsium* (*Thel. cæsia*, Nees), comparing it with the similar arrangement in *Coprini*. It is highly probable that he considered them as superficial.

Up to this time all seem agreed that the reproductive bodies are superficial. Müller and Bulliard figured them as supported by peduncles; and Bulliard and Persoon detected the quaternary arrangement in *Thelephora*. Modern notions of the structure of the hymenium appear to have arisen from two important memoirs of Link, to which we have now to call at-

* *Histoire des Champignons de la France*, vol. i. p. 44. &c. Paris, 1791.

† *Observationes Mycologicae. Pars prima.* Lipsiæ, 1796.

tention. In 1809 Link* first described and figured the reproductive bodies as contained in thecæ, in the genus *Agaricus*. *Merulius*, *Cantharellus*, *Xylophagus*, *Dædalea*, *Boletus* (fig. 59), *Fistulina*, *Sistotrema*, *Hydnum* (fig. 61), *Thelephora*, *Stereum*, *Merisma*, *Clavaria* are also described as thecigerous. "Omnibus fere series unica sporidiorum in theca excepto *Coprinus* et paucis aliis." Of *Coprinus*, he says, "Ab omnibus fere Fungis caractere singulari thecarum differt. Hæ enim non juxta positæ sunt ut in *Agaricis*, nec unicâ sporidiorum serie farctæ, sed segregatæ majores quadruplici sporidiorum serie refertæ. Hinc sporidia dum effunduntur quaternatim disposita sunt, donec nimia prodeuntium copia ordo turbatur." The figures, it should be observed, are by Ditmar. The same year produced another memoir on the same subject from the same pen†. The analyses of Hymenomycetous genera are upon the whole more clearly made out. In *Amanita bulbosa* tab. 1, fig. 14, the sporidia are represented as contained at first in the thecæ and then escaping. Of *Coprinus* he says, "Thecæ magnæ sporam regulariter emittentes in frustulis segmenti parum obliqui apparent, unde satis patet quamlibet thecam quaternam sporarum seriem amplecti, et hanc ob causam, sporam ad quatuor orificii latera excutere." It is clear from this that his figure of the contents of the thecæ in *Coprinus* is ideal, representing what was supposed to be the structure, and not what was actually seen. The united authority of Link and Ditmar has prevailed to hand down this notion almost to the present moment.

In the same year, however, Mr. Sowerby‡ figured the spores in *Merulius lamellosus* (*Ag. panuoides*, Fr.) as naked and seated upon short hairs. The same appearance is represented in the figure of *Hydnum membranaceum* published in 1801. In both cases the bodies are called glands in the text.

In 1813 Ditmar§ ascribed thecæ to *Agaricus phlebophorus*.

* Der Gesellschaft naturforschender Freunde zu Berlin Magazin. Dritten Jahrgangs, erstes Quartal. Berlin, 1809. Observationes in Ordines Plantarum Naturales. Dissertatio prima.

† Nova Plantarum genera e classe Lichenum, Algarum, Fungorum; in Schrader's Neues Journal für die Botanik, vol. iii. Erfurt, 1809.

‡ Coloured figures of English Fungi, tab. 403. Supplement. London, 1809.

§ Deutschlands Flora. 3^{te} Abtheilung. Nurnberg, 1813.

He has not however represented sporidia within them. In 1814 he represented sporidia within the thecæ in *Ag. pluteus*, and, amongst the thecæ, urn-shaped bodies crowned with two or three spicules. This was, in more modern times, the first step, however distant,—for he does not consider them as having any immediate connexion with the sporidia, but compares them with the utricles in *Coprini*,—towards a knowledge of the true arrangement of the spores in the rest of the Agarics. Under *Cantharellus villosus*, Pers., thecæ are also represented as containing from one to three globose sporidia.

Nees von Esenbeck's* important work appeared in 1817. His original designs of analyses of various pileate and clavate genera are on the whole in perfect accordance with those copied from Link. Under *Thelephora cæsia*, the figure of which is copied from that of Persoon alluded to above, it is remarked that the quaternary arrangement of the sporidia forms as it were a prelude to that in *Coprini*. From this it should seem that he regarded them as contained in thecæ (*asci*).

Fries† in 1821 describes the asci generally in his *Hymenomycetes evoluti* as “in superficie collocati immersi. Sporidia in ascis seriatim disposita.” Under *Thelephora*, β *Phylacteria*, he writes, “Sporidia quaterna serie Coprinorum instar disposita.”

Dr. Greville‡ commenced his great work in 1823. Twenty pileate and clavate Fungi are there more or less analysed; the figures according entirely with the observations of Link, Dittmar, and Nees von Esenbeck. In 1825 Fries§ separated *Thelephora* from *Auricularia* on account of the quaternary arrangement of the sporidia. Dr. Greville followed him in this separation, but apparently did not understand Fries correctly, as the asci of *Thel. laciniata* are figured as containing a single row of four sporidia, whereas Bulliard figured to a certain degree correctly their quaternary arrangement on a peduncle, a fact which Fries could not have overlooked. Indeed experience has clearly shown that Dr. Greville must have been

* *System der Pilze und Schwämme.* Würzburg, 1817.

† *Systema Mycologicum*, vol. i. p. 1. Gryphiswaldiæ, 1821.

‡ *Scottish Cryptogamic Flora.* Edinburgh, 1823, &c.

§ *Systema Orbis Vegetabilis*, p. 1. Lundæ, 1825.

misled by a confidence in Fries' correctness, who however appears not to have had himself a very clear perception on the point. Fries' real notion, though nowhere expressed very distinctly, is perhaps sufficiently clear from the expression* "Hymenium e setulis quaternatis," under the subtribe *Phylacteria* of *Thelephora*.

In 1828 M. Desmazières† described the sporidia of *Ag. radians* just as Link had done those of the *Coprini*, "les sporules sont, comme dans les *Coprini* avant la destruction de l'hyménium, disposées sur quatre rangs dans des thèques distantes les uns des autres."

In 1830 Fries‡ still described and figured *Favolus Brasiliensis* and *Cyclomyces fusca* as ascigerous. In the latter sporidia are figured in the asci.

In 1831 Krombholz§ published figures by Corda of the fructification of *Agaricus*, &c. I have not seen the work myself, but from the account of it in the *Linnaea* I conclude that it accords with the observations of Link and Ditmar. Articulations are figured in the fruit-cells of *Ag. alutaceus*, but evidently from incorrect observation, though he is borne out by Nees v. Esenbeck. See fig. 199 B.

In 1833 Klotzsch|| figured in *Favolus Boucheanus* clavate asci containing sporidia. Wallroth's *Flora Crypt. Germaniæ* published in the same year follows the views of Link.

In the third volume of *Nouv. Ann. du Muséum* are some observations on Fungi by Dutrochet, republished in the collected *Memoirs*, vol. ii. in 1837, with the author's latest corrections. Turpin there figures the reproductive bodies of *Cantharellus Dutrochettii*, Mont., (which is apparently a state of *Ag. panuoides*, Fr.) as attached to the walls of the filaments of which the gills are composed. There is also a memoir on the same Fungus by M. Turpin, vol. xiv. des *Mém. de l'Ac. des Sciences Naturelles*, which I much regret that I have not seen.

The second part of the fifth volume of the *English Flora*

* *Elenchus Fungorum sistens Commentarium in Systema Mycologicum*, vol. i. p. 170. Gryphiswaldia, 1828.

† *Annales des Sciences Naturelles*, vol. xiii. p. 215.

‡ *Linnaea*, vol. v. p. 511, 512.

§ Krombholz *naturngetreue Abbildungen der essbaren, schädlichen und verdächtigen Schwämme*. Heft I. Prag. 1831.

|| *Linnaea*, vol. viii. p. 316.

was published in 1836. Under *Ag. prunulus*, p. 76, I have given the following description: "Gills covered with very minute conical papillæ, ending in four spiculæ. Sporules often seated upon the spiculæ." The fructification of *Ag. cernuus*, *Ag. bifrons*, *Ag. gracilis*, and *Ag. disseminatus* is described as quaternate. In *Ag. senioratus* the reproductive bodies are described as quaternate, the major axis perpendicular to the gills. Under *Ag. pannuoides* it is remarked that "the gills are beset with minute hairs, upon which the sporules are often seated, as in *Ag. prunulus*."

A paper by M. Montagne* was read before the Academy of Sciences at Paris on January 2, 1837, in the report of which are the following observations: "Des planches dessinées à la chambre claire du microscope composé de M. Charles Chevalier sont destinées à montrer tous les degrés par lesquels passe une sporidie avant de se détacher de l'utricule où elle a pris naissance. Avant sa chute, cette sporidie est ordinairement supportée par un pédicelle plus ou moins long, qui se forme peu à peu, quoique d'une manière très prompte en égard à la vie éphémère de ces végétaux, aux dépens du sommet de l'utricule, qu'elle chasse devant lui." The latter sentence is so confused that the reporter's meaning is not clear; but judging from the observations on the evolution of *Botrytis Bassiana*†, with which it is expressly compared, it should seem that M. Montagne considers the reproductive bodies as essentially internal; in other words, as sporidia and not spores. "Les sporidies," he says, speaking of *Bot. Bassiana*, "se forment à l'intérieur des filaments, et en sortent et se groupent symétriquement à l'extrémité des ramules par un mécanisme que nous avons tenté d'expliquer. Elles s'échappent de l'extrémité des filaments et des rameaux par un mécanisme particulier qui consisterait en ceci. Chaque seminule arrivée à l'extrémité du tube, avant de s'en séparer, en emprunterait une seconde enveloppe qu'elle conserverait."

It is clear that when the notices given above from the English Flora were published, I was not satisfied with the cha-

* Recherches anatomiques et physiologiques sur l'Hymenium, &c.

† Expériences et Observations sur le Champignon Entomectone, ou histoire botanique de la Muscardine. Par M. Montagne, Aug. 16, 1836.

racters assigned to the hymenium of Agarics ; but the great body of authority in favour of the received notions prevented my doing more than recording such isolated observations, which indeed are accompanied in the text with other circumstances which are not always perfectly correct. The acquisition of a more powerful doublet than I before possessed determined me to examine accurately the structure in *Coprinus*, in Link's account of which I did not feel confidence ; and the result was such as to lead to a more extended examination of species of the genus *Agaricus* belonging to different tribes, and those of other pileate genera. The clavate Hymenomycetes were then reviewed, and the investigation has ended in a conviction that, notwithstanding the vast body of authority and evidence which existed on the point, the structure has been almost uniformly mistaken since the publication of Link's observations, and that in true pileate and clavate Fungi asci do not exist, but that the reproductive bodies are naked, and consequently are, properly speaking, neither sporules nor sporidia, but spores, and that with very few exceptions they are quaternate as in the *Coprini*. In proof of this position I will begin by stating what I find to be the structure in *Coprini*, in which it is most easy to form a correct estimate ; and then, in order, give the result of my observations in other tribes of the genus *Agaricus*, and as many genera as I have been able to examine of pileate and clavate Fungi.

It is perhaps right that I should state that, with the exception of the few similar facts published in the English Flora, all my observations have been made subsequently to the presentation of Montagne's Memoir, though without a knowledge of its existence.

The agaric first examined was a form of *Ag. micaceus*, differing from the ordinary state of that species in having the pileus minutely pilose instead of being sprinkled with mealy particles. As it grew in dense clusters consisting of individuals in every stage of growth, it afforded me a good opportunity of tracing the development of the hymenium. In very young specimens it consisted of oblong, obtuse, transparent cells, disposed side by side like the pile of velvet with their tips all level. It was not possible with a magnifying power of

600 diameters to trace the cellular texture of the substance interposed between the two layers of the hymenium, though in an extremely thin slice cut in the direction of the gill there was a faint trace of lines running in the direction of the section. There was scarcely any change so long as the margin of the pileus was not detached from the stem; but in an individual a little more advanced some of the cells were found to have acquired a more cylindrical form, having grown faster than the others, and in consequence to project beyond them. The intermediate substance was now seen to consist of elongated, somewhat anastomosing cells, coated on either side by a layer of shorter ones, which are subglobose. The contents of the cells of the hymenium are grumous. As the pileus expands, the tips of some of the more elongated cells, or, if I may so call them, sporophores, show four minute points disposed nearly in a square, which rapidly increase in length till they are about half as long as the portion of the sporophore which is emersed. In this stage of growth they are slightly curved inwards. On the tip of each of these a minute globule is soon developed, which is at first perfectly pellucid. This rapidly increases, acquiring an oval form, though more gibbous on the side which is turned from the axis of the sporophore, so that the position of the perfect spores upon the spicules is oblique. The apex becomes minutely papillate, and at the base there is a very short peduncle. The grumous contents of the spores, which were at first almost colourless, acquire in the perfect fruit a rich purple brown. The contents of the sporophores as they increase become more distinctly granular, and are attracted towards the apex as the spores are developed, which appear to be nourished by them. When the spores are perfected the sporophores are nearly empty.

It is to be observed that the sporophores in the mature plant are not all of the same height. In looking down upon a thin slice from the surface of the gill, the lowest, which are frequently without spores, appear like circles; others are observed to be furnished with four spiculæ; and it is not uncommon, when the gill has not acquired its deepest tint, to see the spores themselves in various stages of development. The

large utricles so conspicuous in most *Coprini* were here extremely few. The arrangement of the sporophores appears to be by no means vague. Link figures the spaces between the sori as square. This does not accord with my own observations. I find them triangular in *Ag. striatus*, Bull., five or six being arranged around each sporophore, so that the sporophores are arranged round a central one in pentagons or hexagons. In *Ag. macrocephalus*, Berk., the sporophores are urn-shaped and supported upon long peduncles. The cellular layer beneath the hymenium is here exceedingly obscure, and the central stratum very thin and consisting of filaments much more slender in proportion than in *Ag. micaceus*. In that species there are about three layers of subglobose cells between the hymenium and the central stratum. In *Ag. momentaneus* the sporophores are similar; and the utricles large as in *Ag. macrocephalus*.

The quaternary arrangement of the spores has been recognised from the time of Micheli, but no one appears to have suspected how general it is in Agarics. It may, however, be very readily seen with a good doublet, if a thin slice from the surface of the gill be examined; and a thin transverse section will show them to be arranged on the spiculæ of the sporophores exactly as in the *Coprini*.

Taking the tribes as they stand in Fries, I will mention the species which I have had under observation, making occasional notes where requisite.

The quaternary arrangement then has been verified in

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|-----------------------------|------------------------------|
| <i>Ag. phalloides</i> , Fr. | <i>Ag. Columbetta</i> , Fr. |
| — <i>vaginatus</i> , Bull. | — <i>emeticus</i> , Schaeff. |
| — <i>pantherinus</i> , Dec. | — <i>fætens</i> , Pers. |
| — <i>rubescens</i> , Fr. | — <i>voleum</i> , Fr. |
| — <i>muscarius</i> , Linn. | — <i>theiogalus</i> , Bull. |
| — <i>procerus</i> , Scop. | — <i>rufus</i> , Scop. |
| — <i>erubescens</i> , Fr. | — <i>pyrogalus</i> , Bull. |
| — <i>hypothecus</i> , Fr. | — <i>fuliginosus</i> , Fr. |
| — <i>luridus</i> , Schaeff. | — <i>piperitus</i> , Bolt. |

In most, if not in all the *Galorrhæi*, the spores are minutely echinulate. In *Ag. flexuosus*, Fr. alone, the arrangement of

the spores appears to be uniformly binary, the one being exactly opposite to the other. The other pair appears to be suppressed.

The arrangement is quaternary again in

| | | |
|--------------------------------|--|-------------------------------|
| <i>Ag. nebularis</i> , Batsch. | | <i>Ag. pelianthinus</i> , Fr. |
| — <i>grammopodius</i> , Bull. | | — <i>balaninus</i> , Berk. |
| — <i>ceraceus</i> , Wulf. | | |

In the two latter, which belong to the section *Calodontes*, besides the fertile sporophores, there are barren ones or utricles, which are coloured, and give the peculiar character to the section.

| | | |
|-----------------------------|--|---------------------------|
| <i>Ag. radicans</i> , Relh. | | <i>Ag. pudens</i> , Pers. |
|-----------------------------|--|---------------------------|

The gills are studded with cells much longer than the sporophores, which in some states are surmounted by a large pellucid globule. This at length vanishes and leaves the tip of the utricle denticulate.

| | | |
|-----------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Ag. velutipes</i> , Curt. | | <i>Ag. prunulus</i> , Scop. |
| — <i>peronatus</i> , Bolt. | | — <i>fertilis</i> β . <i>intybaceus</i> , Fr. Occasionally in this species there appear to be only three spiculæ and three spores. |
| — <i>oreades</i> , Bolt. | | — <i>rhodopolius</i> , Fr. |
| — <i>tenacellus</i> , Pers. The gills have utricles like those of <i>Ag. radicans</i> . | | — <i>chalybeus</i> , Pers. |
| — <i>Rotula</i> , Scop. | | — <i>asprellus</i> , Fr., or an allied species. |
| — <i>ostreatus</i> , Jacq. | | |

In most of the *Hyporrhodia* the spores are very irregular in form, with a globose central nucleus (sporidium) which is small in proportion to the spore itself.

| | | |
|-----------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------|
| <i>Ag. gentilis</i> , Fr. | | <i>Ag. pusillus</i> , Dec. Cylindrical utricles. Spores occasionally reduced to two. |
| — <i>scaurus</i> , Fr. In this species there are sometimes five spores together. | | — <i>campestris</i> , Linn. |
| — <i>rimosus</i> , Bull. | | — <i>lateritius</i> , Schaeff. |
| — <i>cucumis</i> , Pers. | | — <i>stipatus</i> , Pers. |
| — <i>tener</i> , Schaeff. | | — <i>gracilis</i> , Fr. |
| — <i>trechisporus</i> , Berk. The spores have little granules upon them. The utricles are like those of <i>Ag. pudens</i> . | | — <i>semiovatus</i> , Sow. |
| — <i>involutus</i> , Batsch. Gills with large pointed transparent utricles many times longer than the sporophores. | | — <i>titubans</i> , Bull. |
| | | — <i>disseminatus</i> , Pers. |
| | | — (<i>Gomphus</i>) <i>rutilus</i> , Schaeff. Spores elongated; grumous, contents disposed in two masses. |

In all these species it will be observed the reproductive bodies are naked spores, and that, except in *Ag. flexuosus*, the arrangement is almost uniformly quaternary. The exceptions are very rare, and no more invalidate the general rule than occasional additions or suppressions of parts in phænogamous plants. In all, the major axis of the spores is vertical to the gills, and in general they are placed rather obliquely upon the spicules.

But this description of the spores and their arrangement applies with slight modifications to other pileate Hymenomycetes. In all, the reproductive bodies are naked spores seated upon spicules which crown the sporophores, and in the genera which most abound in species the arrangement appears to be in general quaternary, though in some genera the number four does not prevail. It must be confessed, however, that a sufficient number of species have not yet been examined to warrant any general conclusion.

In *Cantharellus cibarius*, Fr., and *C. tubæformis*, Fr., the spores are six, seated upon rather long spicules disposed in pairs so as to form an ellipse, two pairs forming a square in the narrow part of the ellipse, and the other seated at the apices of the major axis ::·; or five by the suppression of one of the spores belong to the single pair. In *Canth. cornucopioides*, Fr., there is only a single pair, apparently from the suppression of the four which form a square. In *Canth. fissilis*, Fr., the spores are solitary, but still seated on spicules. *Polyporus squamosus*, Fr., has quaternate spores.

Boletus subtomentosus, Linn.
—— *pachypus*, Fr.

Boletus luridus, Schaeff.
—— *scaber*, Bull.

Have the spores quaternate. There are also acuminate utricles, generally furnished with an articulation towards the tip.

In *Hydnum repandum*, L., the spores vary from three to five. In *Hydnum farinaceum*, Pers., they are solitary, which is probably the case in most of the lower resupinate Fungi.

Thelephora lacinata, Pers.
—— *cristata*, Fr.

Thelephora purpurea, Pers.

The arrangement is in these quaternate. In the latter there are cylindrical utricles, and probably the bristles in *Thel. rubiginosa*, &c. are of the same nature.

Phlebia vaga, Fr., has quaternate sporidia.

We have now to inquire what is the arrangement in the clavate Fungi which are clearly very closely related to the Pilcati. In point of structure the hymenium is just like that of the pileate species. In *Clavaria cristata*, Pers., the spores are binary, or occasionally ternary. In *Clav. crispula*, Fr., ternary or quaternary. In *Clav. vermicularis*, Swartz., binary. *Calocera viscosa*, Fr., has solitary spores curved like those of some *Tremellæ*. In *Typhula gyrans*, Fr., the spores are quaternate.

In *Geoglossum*, *Spathularia*, and *Mitrula* it is well known that the reproductive bodies are not spores, but sporidia contained in distinct asci. In *Geoglossum* they are curved and septate. *Spathularia* has very long and slender sporidia, which are filled with sporidiola, thus approaching very near to *Leotia*, in which they are cylindrical, containing four globose sporidiola. At present I have not seen perfect sporidia in *Mitrula*. It is clear then that these genera, which differ so essentially in their fructification, are not properly associated with the clavate Hymenomycetes.

The essential character of hymenomycetous Fungi appears then to consist in a hymenium composed of closely packed sporophores, which support on spicules a generally determinate number of spores. If this be deemed of the importance I am inclined to attribute to it, the elvellaceous Fungi, as also the Cupulati, cannot be included in the same primary division. The Tremellini, on the contrary, appear to me to be true Hymenomycetes. In *Tremella albida* the curved spores are superficial, vertical with regard to the hymenium, and seated obliquely upon spicules, almost exactly as in *Calocera viscosa*. At present I have not had sufficient leisure to examine their structure attentively, and there are some peculiarities in it which I do not understand. The Sclerotiacei I consider another tribe of true Hymenomycetes, though very imperfectly organized. I have stated in the English Flora that I believe the true "ideal notion" of their structure is that of highly condensed Hyphomycetes, which, if the analogy of the spores in *Botrytis* be taken into consideration, confirms greatly the present view. The abbreviated flocci of *Botrytis curta*, Berk., with their two or three spiculæ-form branchlets, each

bearing a spore, resemble very closely the sporophores of pileate and clavate Hymenomycetes. The notion that they are condensed Coniomycetes arises from the consideration of one or two obscure epiphyllous species, which are scarcely more than abortive Uredos.

We have then, as the typical group of Hymenomycetes, *Agaricus* and allied genera. The subtypical consists clearly of the clavate genera *Clavaria*, *Calocera*, &c. The Tremellini and Sclerotiacei form two aberrant groups. The third aberrant group consists, if I mistake not, of *Isaria* and certain allied genera. It is only necessary to compare the prickles of one of the resupinate *Hydna* with the fruit-bearing hairs of *Isaria citrina*, or, what is better, some of the more obscure *Pistillariæ* and *Typhulæ*, to be convinced of the propriety of such an arrangement. *Anthina*, with its subgenus *Pterula*, is still more evidently allied. *Ceratium* again has spores disposed on short bristles, altogether reminding us of the Hymenomycetes. The sporidia, of the second order mentioned by Greville and Fries, are merely the tips of the spicules from which the spores have fallen. It is remarkable that these spicules are distinctly disposed in quincunxes. The spores too, when seen with high powers, are much narrower at one end, and have their longer axis vertical to the hymenium.

The pileate Fungi pass evidently into the Tremellini by means of *Phlebia mesenterica*, which scarcely differs generically from *Exidia Auricula Judæ*. The Tremellini are connected with Sclerotiacei by means of *Pyrenium*, and these again with Isariacei by means of *Periola*.

If we now turn to the cupulate and mitrate Fungi excluded* from Hymenomycetes, we have in them, if I mistake not, the typical and subtypical groups of another grand division characterized by the presence of true asci; *Peziza* and its allied genera forming the first, and *Helvella*, *Leotia*, &c., exactly analogous to Clavati, forming the second. We shall then have as the aberrant groups the Scleromycetes, Perisporiacei, and that part of Angiogastres comprising the truffles, *Carpoboli*, and *Nidulariæ*.

* In the new Systema Fungorum, the twelve first sheets of which I have received from the author since the above was printed, these are, in fact, now separated by Prof. Fries from Hymenomycetes, under the title of Discomycetes. The Hymenium in the former is still described as ascigerous.

We cannot doubt the very close relation of the cupulate and scleromycous groups. The Scleromycetes evidently pass into the Perisporiacei by means of some of those epiphyllous species whose asci are reduced to the form of sporidia, and the sporidia in consequence mere sporules. This makes way through *Perisporium* for a new form of free asci, the so-called sporidia of *Erysiphe*. The transition from thence to Angiogastres is very easy through *Polyangium*. The *Carpoboli*, as Fries has admirably pointed out, are *Perisporia* with a volva. The circle returns to Mitrati through *Tuber* and *Rhizina*. The Hymenomycetous and Uterine circles are connected by *Tremella* and *Tuber*. I have reason to think that this will appear much more evident than it does at first sight, when the structure of *Tremella* shall have been more perfectly studied.

The intimate structure of the Phalloid Fungi, as I hope to show at some future opportunity, is exactly that of Trichogastres, as appears from the examination of both before maturity. Indeed the transition from them through *Battarea* and *Geastrum* is far from abrupt.

I am inclined then to think that the typical and subtypical groups of the Gasteromycetes consist of Trichogastres and Phalloidæi; two of the aberrant groups being Myxogastres and Trichodermacei.

The phalloid group is connected with Trichodermacei by *Spadonia* and the curious fungus figure by Battara, tab. 40, A—E, a Phallus, without a volva. The gasteromycous circle is evidently connected with the uterine by *Egerita*.

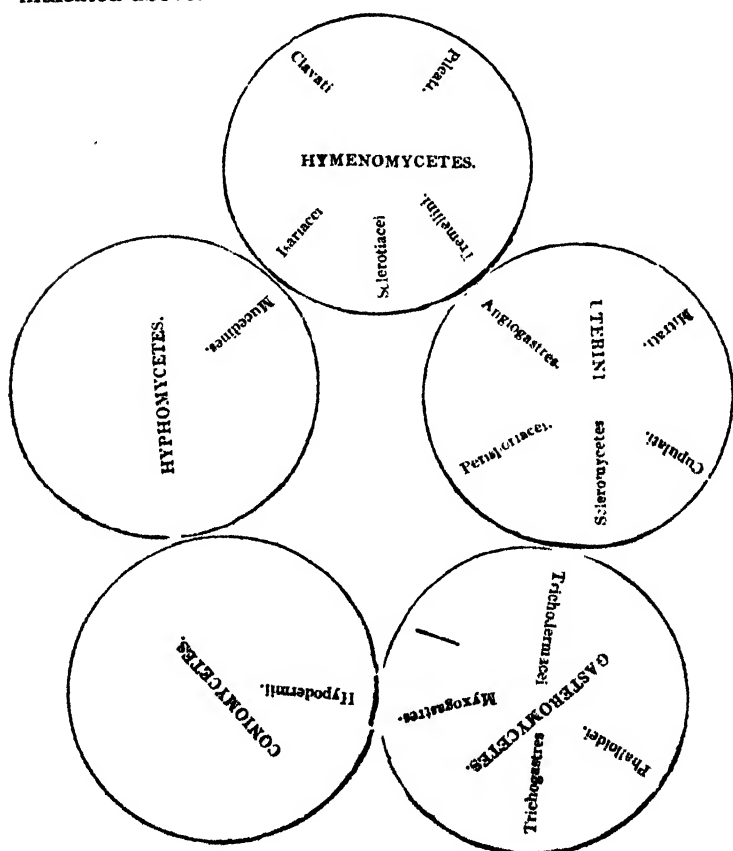
The group Myxogastres, as Fries remarks, differ in their singular vegetation * from all other Fungi, and have but few and remote analogies. The old notion of their connexion with Hypodermii is, I believe, correct, and by means of these they pass either into Coniomycetes, or through them to Trichodermacei. At present, however, I dare not venture to remove them from Coniomycetes. The fifth group, therefore, is left blank in the diagram.

I do not attempt to indicate the groups of Hyphomycetes

* It is curious that spiral vessels, differing in no respect, as far as I have been able to discover, from those of phænogamous plants, have been observed by M. Corda and myself, to compose the flocculent mass in the genus *Trichia*.

or Coniomyces, as so much uncertainty still exists with regard to many of them. Indeed, notwithstanding all the attention that has been paid to Fungi, it may be asserted without fear of giving offence, that the modern improvements of microscopes have opened quite a new field to the mycologist. All the genera require an accurate revision, and in such case, I am sure from my own experience, that the structure of many would be found to differ much from received notions. If it had not been from the imperfection of instruments, it is quite impossible that it should have fallen to the lot of any one at the present day to describe the true structure of the hymenium in Agarics, or that the quaternary arrangement should have been scarcely recognised except in the *Coprini*.

The annexed is a tabular view of the affinities of Fungi as indicated above.



I am by no means positive as to its correctness in all points. I have probably in some instances confounded analogies with affinities; but they are thrown out at least as hints. It would carry me to greater length than is desirable to state fully the grounds on which they are indicated. My object is principally to call the attention of students to ~~the~~ the room which still remains for investigation, even in the field which has been so successfully trod by Fries. Too much attention cannot well be paid to any of his suggestions, to which every mycologist must acknowledge the deepest obligations. It seems, however, almost impossible that any system can be right in all its parts which is founded on false notions of the structure of the group of highest importance.

The facts stated above confirm in a striking degree the theory that a quaternary arrangement prevails in Cryptogamic plants. It will be seen from the anomalous cases mentioned above that the spicules have a definite arrangement, even when the number exceeds four. Few facts are more curious than that the number four should prevail when the fructification consists of spores, and a multiple of four when it is contained in asci.

How far modifications of the form of the sporophores may be found of use in distributing the species of the genus *Agaricus* I am not prepared to state, not having made a series of observations with a view to that especial point. M. Montagne, it appears, is distinctly of opinion that they are of great value, taken in connection with the structure of the inner substance of the gills. Link pointed out nearly thirty years since that an easy distinction is afforded by the nature of the cellular substance between the *Russulæ* and *Ag. Russula*. The subject is one of considerable interest, but of extreme difficulty, and requires for its investigation all the aid that can possibly be afforded by the best instruments and the most dexterous manipulation; and no attempt at generalization can well be expected to be successful till some hundreds of species have been examined. It cannot be in better hands than in those of the learned French mycologist, the publication of whose memoir we wait for with great anxiety.

EXPLANATION OF PLATES.

PLATE IV.

- Fig. 1. Section of gill from a very young specimen of a var. of *Ag. micaceus*, showing the young sporophores not yet distinct from the other cells of the hymenium.
2. Ditto, in a specimen rather more advanced. The sporophores have become more cylindrical, and are longer than the other cells. The central cellular substance of the gill is distinctly marked.
3. The sporophores have acquired four spicules.
4. Section very highly magnified, showing the spores just beginning to be developed, and a sporophore with four spores more advanced.
5. Tip of sporophore, with four infant spores, magnified 600 diameters.
6. Ditto, with four mature spores.
7. A spore seen from one side.
8. Ditto seen from behind.
9. Portion of gill of *Ag. momentaneus*, with two sporophores and an utricle.
10. Ditto of *Ag. macrocephalus*, showing an utricle, with sporophores and spores in various stages of growth.
11. A form sometimes assumed by the utricles in very young plants.
12. Utricle.
13. Part of a gill of *Ag. striatus*, showing the disposition of the sporophores, each of which is marked with four dots, which are the tips of the spicules.
14. Sporophores in *Ag. Phalloides*.
15. Tip of sporophore, with its four spores in *Ag. nebularis*.
16. Portion of gill of *Ag. velutipes*, from a sketch by Mr Cornelius Varley, very highly magnified.
17. Tip of sporophore of *Ag. flexuosus*, with its two echinulate spores.
18. Sporophore of *Ag. Volenum* with its four echinulate spores.
19. Spore of the same.
20. Portion of hymenium of *Ag. pudens*. Two of the utricles are crowned with a transparent globule; in one the globule has vanished, and another is obtuse without any crown.
21. Portion of hymenium of *Ag. balaninus*, with its coloured utricles. The structure of *Ag. pelianthinus* is similar.
22. Sporophores of *Ag. fertilis*, var. *mybaceus*
23. Spores.
24. Spores of *Ag. chalybeus* and *Ag. asprellus* with their nuclei.
25. Portion of hymenium of *Ag. tener*.
26. Portion of hymenium and pileus of *Ag. rimosus*.
27. Hymenium of *Ag. involutus*, with utricles.
28. Spores of ditto.

PLATE V.

29. Hymenium of *Ag. pusillus*, with an utricle and a sporophore bearing two spicules.
30. Hymenium of *Ag. semiovatus*.
31. Hymenium of *Gomphus rutilus*, with utricles.
32. Sporophore of ditto.
33. Spore.
34. Tip of sporophore of *Ag. ostreatus*.
35. Spore.
36. Portion of hymenium of *Cantharellus cibarius*.
37. Ditto of *Cantharellus cornucopioides*.

38. Spicules and two spores of the same.
39. Horizontal section of hymenium of *Boletus luridus*.
40. Utricle of *Boletus scaber*.
41. Spore of ditto.
42. Portion of hymenium of *Hydnum repandum*.
43. Spore of ditto.
44. Portion of hymenium of *Thelephora laciniata*.
45. Ditto of *Thelephora purpurea*, showing an utricle.
46. Ditto of *Clavaria cristata*.
47. Spore and spicule of *Calocera rosea*.
48. Portion of *Phlebia raga*, highly magnified.
49. Hymenium of ditto.
50. Sporidium of *Geoglossum difforme*.
51. Sporidia of *Spathularia flaccida*.
52. Sporidium of *Leotia lubrica*.
53. Sporophore and spores of *Agaricus trechisporus*.
54. Spores of ditto.
55. Utricles of ditto.
56. Utricle in which the globule has vanished.

IX.—*Notices accompanying a Collection of Quadrupeds and Fish from Van Diemen's Land.* By RONALD GUNN, Esq., addressed to Sir W. J. Hooker, and by him transmitted to the British Museum. *With Notes and Descriptions of the new Species.* By J. E. GRAY, F.R.S., &c.

MAMMALIA.

1. *THE Thylacinus cynocephalus* is called in Van Diemen's Land indiscriminately by the names of Tiger and Hyæna. It is common in the more remote parts of the colony, and they are accordingly often caught at Woolnorth and the Hampshire Hills. I have seen some so very large and powerful, that a number of dogs will not face one. They are usually nocturnal in their attacks on sheep, but they also move about in the day time; and upon those occasions, perhaps from their rather imperfect vision by day, their pace is very slow. A number of skins could be procured if much wanted, or their skulls perhaps more easily. In Murray's Ency. of Geography it is stated, p. 1485, that its *tail is compressed*, which suggests the supposition that it is used in swimming. The tail is *not* compressed, neither is it at all aquatic in its habits. They are most numerous *inland*, and when I was recently at the Hampshire Hills two were caught in one week at the sheep, twenty miles from the sea. As to their feeding on fish, I

hardly know how it could have been ascertained, unless the fish had been previously caught and given to one, when, like many carnivorous quadrupeds, it is probable it would eat them. Deductions are frequently too hastily drawn by naturalists (or persons professing to be such) from isolated facts. That the *Thylacinus* may often be seen on the sea-coast, as also every other species of our quadrupeds, is quite probable, and may once or twice have been seen eating a dead fish thrown up by the sea; but as to its *fishing*, it is out of the question.

2. (*Phalangista Cookii*?) is common near Launceston, and is there usually called Ring-tail Opossum as a specific name. All the opossums come out of the holes of the trees, in which they usually sleep all day, about twilight; and for an hour or two after sunset they may be seen busily employed eating the leaves of the various species of *Eucalypti*: on the branches on moonlight nights they are usually shot, and opossum shooting is sometimes fine sport where a few join together. Orchards in country places suffer sometimes from the opossums eating all the leaves and young branches.

3. (*Phalangista Vulpina*.)—The habits of this species are described under No. 2. It is the most common species near Launceston, and there usually called Brush-tail Opossum.

9. (*Phalangista fuliginosa*, Ogilby?)—Iris reddish brown. It is the kind from Circular Head, and some specimens attain a size fully as large as No. 3. At Circular Head I have seen neither Nos. 2 or 3. A small species of *Phalangista* (*Phalangista nana*, Geoff.?) exists in Van Diemen's Land about the size of a large mouse; but although I have seen some alive in the possession of gentlemen, I have been unable to procure a specimen. No species of *Petaurus*, or flying opossum, exists in Van Diemen's Land, although one species, *P. sciureus*, is abundant at Port Philip and along the south coast of New Holland.

6. *Perameles Gunnii*, Gray. Bandicoot.—The bandicoots are very numerous everywhere; they burrow in the ground universally as far as I have seen, and live principally on roots. I knew one gentleman's entire collection of Cape bulbs, principally *Babianæ*, eaten by them, and I suffered considerably

myself, having lost some entire species of bulbs through these animals.

4. *Phascolomys*, Wombat.—Commonly called in the colony by the name of badger. I found this animal in very various situations, on the tops of mountains and in dense forests. In the mountains it finds holes among the rocks in which it can lodge, but in other places it burrows in the earth. It is usually nocturnal I believe, but I have frequently killed them in the day time; their pace is slow, and on being attacked they grunt somewhat like a pig. The skin is excessively thick, and curiously attached to the bones of the hips, as also slightly along the vertebræ of the back. At the hips however you have to cut through solid gristle. The whole skin has to be cut off, as it will not separate from the flesh like the skins of most other animals. The eyes are unusually small, iris dark brown. I obtained a very large one recently at the Hampshire Hills; but the man to whom I gave the skin to immerse in a decoction of bark, put it in the warm liquor, thereby destroying its value: to such losses a person is always subject. It measured thirty-six inches from snout to tail, and thirty-four inches in circumference round the body. Wombat flesh is very good to eat, and I have upon many occasions made hearty meals of it when out in the woods. The aborigines were also fond of it. The molares are remarkable, and by extracting one you will see how curiously they go into the lower jaw; at least they appear so to me, being semicircular and long.

I saw one or two specimens of an animal brought from the south coast of New Holland bearing a general resemblance to the wombat, in being tailless, (the Koala, *Phascolarctos cinereus*?) but I think the toes differed in some points, and it lived on the tops of the trees like the opossums. Its cry at night, I was informed by the gentleman who shot it, was not unlike some of the *early notes* in the braying of an ass.

4*. *Dasyurus ursinus*, the Devil.—I have only been able to procure a young specimen of this species. It exists all over Van Diemen's Land, and naturalists are wrong in supposing that because it, the *Thylacinus*, and some others are found on the sea coast, that they exist there only. The sea coast is certainly the part most likely to be visited by voyagers, but

an inference should not thence be drawn that they only live on the sea coast, and feed on dead seals, &c. I know of no species that exclusively inhabits the sea coast. The *devil* is destructive to sheep all over the colony, and is indeed the most destructive of our indigenous quadrupeds, the *Thylacinus* being much scarcer. The *D. ursinus* is nocturnal, very fierce, and a match for an ordinary dog; they bite very severely.

5. (*Dasyurus Viverrinus*.) the Native Cat of Van Diemen's Land.—Of this animal I think there are many species, differing in size, colour, &c. (*Dasyurus Maugei*;) they are very destructive to poultry throughout the colony, entering fowl-houses by the smallest aperture, and killing an immense number; they only suck the blood, and rarely, if ever, are known to carry off the bodies.

7. *Hydromys chrysogaster*, Water Rat.—I am ignorant of its habits. Found in rivers and streams.

9. *Echidna*.—I have only sent home one miserable specimen of this animal. It is common in some parts of the colony, and I am informed by those who have eaten them that they are excellent food. They are harmless.

10. *Kangaroo*.—Of this genus I know four species in Van Diemen's Land, or perhaps there may be more. The specimen sent is the species known in Van Diemen's Land by the name of "Wallaby." I shall however to a certain extent describe all. First, the forest kangaroo (*Macropus major*, Shaw.) called also the "*boomer*," (from the heavy sound in jumping, I presume,) the "*forester*," and various other names. It is a very large species, frequently exceeding 70lbs. weight; the colour very light mouse colour. It exists on the top of the Western Mountains, and in the more remote parts. On the Western Mountains I saw them in great numbers, and the country being perfectly open I had some beautiful hunting; but in some cases they completely outstripped the kangaroo dogs, which are a cross between the greyhound for speed and bull-dog for strength. I had a tame one which allowed my children to play with it, and was extremely docile. The tail is *not* used in progression, although universally asserted; in leaping they usually hold it out pretty horizontal, but never as a third limb. Indeed, in defence, the hind legs alone are

used, with which they can give most powerful strokes, and a very large kangaroo will keep off in a favourable situation one or more dogs. Kangaroos, although, from circumstances of their food being abundant in spots, as on recently burnt land, they may be seen in flocks, are not gregarious; their food brings them to one spot, but you never see even *two* together properly speaking; and on no occasion have I ever seen or known them in flocks, owning a leader and proceeding *en masse*, as all wild animals do. They are perfectly independent of each other. Kangaroos do not burrow in the ground, although it is so asserted in various works: they lodge during the heat of the day amongst high ferns, such as *Pteris esculenta*, high grass, and in underwood, commonly here called *scrubs*, that is, dense patches of *Melaleuca*, *Leptospermum*, &c., on the margins of streams, &c. And although almost all our forest trees (*Eucalypti*) are hollow at the butt, and innumerable dead and hollow trees cover the ground, I have never known them use them as sleeping places, as is but too frequently asserted: under a dead tree is however much more likely than in the hollow of a live one. Many other assertions, probably equally devoid of foundation, are constantly made by authors, who are but too frequently mere compilers from the assertions of others; and I can assure you even in Van Diemen's Land I receive every statement on natural history subjects with the greatest caution. There is so great a want of investigation, joined to a natural proneness for the marvellous, that a simple fact is perverted to such a degree, that it would puzzle any one to tell how much was really founded on fact.

The next species in size is commonly called the Brush Kangaroo (*Halmaturus?* —?). It is by far the most common everywhere, easily overtaken by swift kangaroo dogs, and used most generally for food. When roasted or the tail made into soup, it bears a pretty close resemblance to hare, and is universally esteemed. It is however usually cut up like mince meat, with salt pork, pepper, &c. and stewed, and is colonially called a steamer; in this way it is really delicious. The skins are tanned and is the only kind of leather used in the colony for the uppers of ladies' and gentlemen's boots and shoes. Many thousands of skins are also annually exported from Van Diemen's Land to New South Wales for the same purpose.

The kangaroos usually feed at night, and in the evenings and mornings, but they are exceedingly sharp-sighted in the day time.

The third species is the "*Wallaby*," of which a specimen is sent. It is of a much darker brown, smaller than either of the preceding, and is most common near the sea, and on the islands in Bass's Strait. They are excellent eating, but the smallness of the skins renders them less valuable for tanning.

A fourth species, commonly called *Kangaroo Rat*, may prove to be of the genus *Hypsiprymnus*; they are considerably smaller than the wallaby, but progress on their hind legs similar to the kangaroo. There may, in reality, be some other species, but I have not closely examined many specimens. Their mode of bringing forth young, &c. is now so much better known in England than out here, that I need make no remarks on the subject.

Milk-white or cream-coloured kangaroos (*Halmaturus albus*, Gray,) exist in Van Diemen's Land, although but sparingly. I also possessed a *white* opossum of No. 3 alive, which I gave Mr. Short to take to England. I had previously possessed a white skin. I presume them all to be albinos.

Notes on the above, with descriptions of two new Species.

By J. E. Gray, F.R.S.

The above paper contains the best remarks on the Mammalia of Van Diemen's Land that I have seen, and corrects several inaccuracies into which naturalists have fallen from not having the opportunity of examining the animals on the spot. Among the collections are two new species, which I shall now proceed to describe. Having occasion some years ago to consult the original description of the wombat given by Bass in Collins's Account of New South Wales, ii. 155, I found that all the difficulty which has occurred with respect to his animal is occasioned by a simple misprint of *five* for *two* in his description, by which he is made to say that the animal "has *five* long grass-cutting teeth in the front of each jaw, like those of a kangaroo; within them is a vacancy for an inch or more; then appear *two* small canines, of equal height with, and so much similar to, *eight* molares situated behind them, as scarcely to be

distinguished from them. "The whole number in both jaws amount to twenty-four." It is evident from his whole number that the cutting-teeth should have been two and not five, as they are in the wombat described by Geoffroy. Illiger, (*Prodromus*, 77,) overlooking this misprint, and being aware that no known Mammalia have an odd number of cutting-teeth, describes his genus *Amblotis* as having six teeth in each jaw. Succeeding naturalists have been inclined to believe that Illiger and Bass's animal is to be discovered. I have seen Bass's specimen, which is now in the Museum of the Natural History Society of Newcastle-on-Tyne: it is the same as the one we now usually receive from Van Diemen's Land, only discoloured by having been kept in spirit.

It is to be regretted that no specimen of No. 2 was sent, as there are two different species confounded under the name of *P. Cookii*, one coming from Van Diemen's Land, which must be called the real *P. Cookii*, as it is the opossum of Van Diemen's Land described by Cook, last Voyage, i. 108, t. 1; from this arises the *Phalanger de Cook*, Cuv. Règ. Anim., i. 179; *Phalangista Cookii*, Temm. Monog., i. 7. The other, which was found near the Endeavour River, New Holland, may be called *Phalangista Banksii*; it is the New Holland opossum of Pennant (*Quad.*, ii. 25.), the Opossum of Hawkesby, Voy., ii. 586, and probably the *Balantia Cookii* of Kuhl. (*Beitr.* 63.) Capt. Cook thought that the Van Diemen's Land animal might be the male of the one discovered by Sir J. Banks in New Holland. Dr. Shaw, in his white-tailed opossum, has partly combined Pennant and Cook's descriptions. Cuvier refers to Cook's plate; and Temminck says that he described a specimen brought home in Capt. Cook's expedition which is now in the Leyden Museum.

9. *Phalangista fuliginosa*, Ogilby? Back and tail black; sides brownish; throat, chest, and belly yellowish brown; under side of the tip of the tail bald.

6. *Perameles Gunnii*, Gray. Muzzle elongate, conical, tapering, grey-brown, with scattered black tipped rigid flattened bristles; lips, throat, belly, inside of the legs, feet, tail, and four broad bands on each side of the rump white; front claws elongate, slightly arched, yellow; ears moderate, rather naked,

brown and hairy in front; the thumb of the hand feet small, subcylindrical, blunt, clawless. Length: head, 5; body, 11; tail, $4\frac{1}{2}$; hind feet, $2\frac{1}{2}$ inches.

These animals have been generally supposed to feed on insects, and Dr. Grant discovered the remains of insects in the stomach of the one he examined.

The "*Wallaby*" kangaroo is quite different from the species which usually goes by that name in this country, and proves to be a species which I have not before seen, belonging to the subgenus *Thylogale*; therefore I shall characterise it.

Halmaturus (Thylogale) Tasmanci, Gray. Blackish brown, reddish and black varied; upper lip, chin, throat, and beneath pale reddish brown; hind feet short, brown, grizzled; tail rather short, scaly, covered with short close-pressed hairs, with longer soft crisped hairs along the upper part of its base. Length, 25; tail, 10?; hind feet, $5\frac{1}{2}$ inches.

This species is very different from any of the specimens which I have described in my lately-published revision of the family, and if the tail is not injured it will agree in the shortness of this member with the *H. Thylogale brevicaudatus*, the *Kangaroo à queue courte* figured by Quoy and Gaynard in the Voyage of the Astrolabe, (Mammalia, t. 19,) but which is quite differently coloured.

FISHES.

I have this season, from my residence being so near the sea, procured a few fish, but have not numbered them. They were all caught in a seine at Circular Head except one species, called a "*Nurse*" (*Cestracion Philippi*, Cuv.); I caught it at Western Port. Another species of shark, called here Sword Fish, (*Pristis cirrhatus*, Lath.) is abundant; the peculiarly prolonged and armed snout struck me as curious: three specimens are sent. A fish called Sea Hedge-hog or Porcupine (*Diodon*) is also very abundant. On being brought to land it inflates itself into a perfect sphere, the skin as tight as a foot-ball, and the spines erect and stiff in all directions from the body: it continues so for some time. Some of the skins now sent are well-preserved.

"Leather Jackets" (*Monacanthus*, Cuv.). Of these, two are

this year sent. They are of a greenish colour, with a strong spine on the back.

"Parrot fish" (*Ostracion*, Linnæus,) so called from the shape of the head and mouth I suppose, as also perhaps from the various and beautiful colours. Of these I send twelve specimens of two or three species; one specimen, although much faded and altered, is still very beautiful.

"Sea Horse," so called, I believe, from a fancied resemblance of the shape of the head to that of a horse. The specimen this year sent I picked up on the beach a few miles from Circular Head; it is of a different species to those usually caught in the rivers Tamar and Derwent. The tail differs considerably.

I think few, if any other, marine productions require notice. I cannot and do not devote much time to the pursuit, but I plainly see that much might be done. To a sincere lover of natural history, possessed of knowledge and the necessary means, a finer field than Van Diemen's Land could scarcely be found. Crabs are very various and curious; fish also. And indeed a good cask of spirits might be filled with sundries highly interesting to a scientific person.

Notes on the Fish. By John Edward Gray, Esq.

"The Nurse" is *Cestracion Philippi* of Cuvier, the *Squalus Philippi* of Schneider, figured as the Port Jackson shark in Philippi's Voyage, t. at p. 283. It is probable from their descriptions that neither Cuvier, Müller, nor Henle have ever seen this species, but were only acquainted with it from the figure above-cited; it is perhaps the only specimen now in European collections. It is much more nearly related to *Scyllium* than any other of the sharks. I am therefore induced to give the following description of the specimen sent by Mr. Gunn.

Cestracion Philippi: muzzle short; nostrils large, near the lips operculate; operculum subspiral (partly injured in the skinning); events? very small, low down on the cheek under the hinder angle of the eye; front teeth small, conical, compressed, lancet-shaped, the larger one with a small lobe on each side of its base; eyebrows elevated, ridge-like. Dorsal fins two, each with a spine in front; anal fin one; caudal fin deeply lobed: the front dorsal fin over the middle of the space

between the large pectoral and ventral fin, the second over the middle of the space between the ventral and anal fins. *Respiratory slips* five, the three hinder ones over the base of the pectoral fins: skin rough, grey, with two very indistinct darker lines on each side of the tail. There is a second species of this genus, from China, which I have described in my Zoological Miscellany, under the name of *Cestracion Zebra*, figured in Hardwick, Drawing of Cartilaginous Fishes, t. 5, which differs in the body being marked with broad black cross bands.

The "parrot fishes," or *Ostracions*, consist of three very distinct and beautiful species allied to *Ostracion auritus* of Shaw (Nat. Misc., ix. t. 338), for which I have formed a subgenus under the name of *Aracana*.

1. *Ostracion (Aracana) ornata*, Gray. Granular, white, with hexangular spots, leaving whitish reticulations; face and belly with alternate unequal dark and white oblique streaks; fins pale; front of dorsal and anal fin dark; caudal fin with a dark submarginal band and dark streaks between the strong caudal rays.

2. *Ostracion (Aracana) flavigaster*, Gray. Granular, pale, with dark longitudinal lines; under lip, throat, and beneath yellow; fins all whitish; front of anal and dorsal fin rather clouded; caudal rays slender.

3. *Ostracion (Aracana) lineata*, Gray. Rough, with tessellated ridges; whitish back, with irregular black marks; face and sides with crooked black streaks; belly and lower lips white; fins all whitish; rays of caudal fin slender; base of tail with three black streaks.

In some specimens of this species the spines (which agree in number and position in all these species) are very short and tubercular, and only rudimentary.

The specimen of *Ostracion auritus* figured by Dr. Shaw, is in the British Museum collection; it appears to be most allied to the last species, but differs from it in being larger and covered with small granules, and is of a nearly uniform brown colour; but this may arise from some imperfection in its original preservation.

In the British Museum there is also a fifth species of this section, sent from China by Mr. Reeves, which I figured in

the Indian Zoology (in t. —.) under the name of *O. (Aracana) auritus*. On comparison with these species it proved to be very distinct, and therefore I propose for the future to distinguish it as *Ostracion Reevesii*. It is much larger than any of the Australasian species. It is regular, granular, with three smooth rather arched bands on each cheek; in its present dry state it is of a uniform whitish grey colour, and much compressed, and higher than the species above described. The rays of the caudal fin are thick. Besides those named in the list there was also sent an *Apistes*, which appears to be new; it may be called *A. Tasmanensis*, Gray: when dry, lead colour, scaleless, suborbital and preopercular spine very long, produced; middle of dorsal fin with a large black spot; palatine teeth velvet-like.

Brit. Mus. Feb. 10, 1838.

X.—*On the Existence of Spiral Vessels in the Roots of Dicotyledonous Plants.* By the Rev. J. B. READE, M.A., F.R.S.

To Richard Taylor, Esq.

Peckham, Feb. 10, 1838.

My dear Sir,

IN the few explanatory remarks which I ventured to offer in Philosophical Magazine for Nov. 1837, on the chemical composition of vegetable membrane and fibre, I had occasion to allude to the existence of spiral vessels in the roots of dicotyledonous plants. The attention of English botanists being hereby directed to a statement somewhat at variance with received principles, I have been requested to furnish a more detailed account than the nature of my former communication permitted. I must beg, therefore, to avail myself of your valuable pages.

It has been usual to consider spiral vessels as peculiar to the structure of monocotyledonous roots, and as forming a distinctive character between the root and the stem of dicotyledons; and so thoroughly has this opinion of their position gained credit, that I have been able in no case to remove it but by giving ocular demonstration that it is in opposition to facts.

An attempt to trace to their origin the spiral vessels in the

main trunk and leaf-stalks of the carrot led to an examination of the layer of vessels which lie immediately under the bark of the root, and these I found, at first sight, to have every appearance of closely-wound tracheæ. Their brittleness, however, and the frequent anastomosis of the successive coils induced me to suppose that they were annular and not spiral; but, upon maceration, the strong membranous tube to which the fibre was firmly attached suffered speedy decomposition, and the spiral thread was readily unrolled. These tubes taper off at each extremity into conical terminations, and I have seen the contained fluid pass from tube to tube through the oval perforation where they overlap each other. This peculiarity of structure, I am well aware, may be looked upon as imparting to these vessels an intermediate form between elongated cells and true vascular tissue; and hence, perhaps, I ought not to adduce them as examples of the true spiral. I would however notice the curious fact that all the very numerous vessels in this root are of the kind now described. Such is not the case in the root of any other dicotyledon which I have hitherto examined.

In the paper to which I have referred I rested the fact of the occurrence of spiral vessels in the roots of dicotyledonous plants upon the single example of the root of common garden mint. To this I may now add the roots of the radish, dahlia, *Convolvulus minor*, and mustard. The interesting phenomena connected with the development of the root of mustard, as well as the structure of the root itself, will amply repay the most minute attention. If a seed be immersed in water, the testa, in the course of a few hours, will be covered with very minute vessels, starting like radii from its surface. The peculiar refractive power of these vessels renders them a remarkably difficult microscopic object, and I should probably have failed without the assistance of my friend Mr. Bowerbank in arriving at an accurate knowledge of their structure. Their form is entirely novel. A number of wine glasses, with long stems, and inserted into each other, may furnish a somewhat apt illustration of their remarkable appearance; and as the walls of the bell-shaped portion are strengthened by a spiral fibre, the vessels may be described in one word as *fibro-can-*

panulate. Were I to theorize upon the possible functions of these, the first instruments of the vital principle, I should probably be met by the rebuke, justly merited indeed when but few facts form the basis of confident speculation, “*La théorie ! la théorie ! peut-être que de long-temps encore il nous sera pas permi de nous guider dans ces recherches à la lueur d’un autre flambeau.*” I pass on, therefore, to describe the structure of the root.

The medullary canal of the stem with its system of vessels is continued without any interruption into the body of the root; or perhaps it would be more accurate to invert the order of these terms, as the root is first developed. The cellular tissue of the young root is studded throughout its entire length with fine fibrils. These I notice for the sake of observing that their length varies under different circumstances of growth. If the seed be well supplied with water these fibrillæ are short, but if the seed be allowed to attach itself to the side of a bottle, for instance, and a few inches from the surface of the water, their length is considerable, and they are constantly beaded, as it were, with small condensed drops of the ascending vapour. It is evident that, in the latter case, the demand for nutriment being greater than the supply, we have a clue to the beautiful contrivance of the elongation of the absorbent vessel. I will here add, though I cannot at present go into the important questions connected with the statement, that the plants which I am now describing were raised in distilled water, and fed by the *vapour of distilled water*.

In addition to these interesting facts connected with the germination of mustard seed, it only remains for me to state that the column of vessels which is found in the body of the root is composed of dotted ducts, derived from the apposition of short cylindrical cells, base to base, annular vessels and spiral vessels. The latter are without doubt “the true vessels which strictly compose the vascular tissue.”

Hoping that these few remarks will serve to elucidate this subject,

I am, my dear Sir,

Faithfully yours,

J. B. READE.

XI.—*Miscellanea Zoologica*. By GEORGE JOHNSTON, M.D.,
Fellow of the Royal College of Surgeons of Edinburgh.
Plates II. and III.

(Continued from p. 56.)

2. *TRITONIA**, *Cuvier*.

CHARACTER. *Body* limaciform, the head indistinct: *mouth* with a pair of corneous jaws, overarched by a veil: *dorsal tentacula* two, fissile and pectinate†, issuing from tubular sheaths: *branchiæ* forming a fringe or a series of arborescent tufts along each side: orifices of generation and anus on the right side in front: *foot* plane. *Cuvier*, *Règ. Anim.* iii. 52. *Lamarck*, *Anim. s. Vert.* vi. i. 303. *Rang*, *Man.* 131. *Blainville*, *Malacol.* 487.

1. *T. Hombergii*, *branchiæ* forming a continuous but unequal arborescent crest along each margin of the back. Plate III. fig. 1, 2.

Tritonia Hombergii, *Cuv. Mém.* iv. 4. *pl.* 1, 2. *fig.* omnes. *Lam. Anim. s. Vert.* vi. 1. 304. *Flem. Brit. Anim.* 281. *Stark*, *Elem.* ii. 68.—

Doris frondosa, *Mull. Zool. Dan. Prod.* 229. *Turt. Gmel.* iv. 79.

Hab. Amongst corallines in deep water, Frith of Forth, *Sir J. T. Dalryell*.
Coast of Berwickshire, not uncommon.

DESC. *Body* from two to four or occasionally even eight inches long, oblong, subtetragonal, the back slightly convex or plane, closely covered with small warts of a brownish colour with a tinge of bluish grey; veil over the mouth contractile, but when expanded forming two semicircular lobes with a margin cut into numerous tentacular points. *Dorsal tentacula* issuing from a wide uneven sheath, columnar, the base white, the upper half dusky, divided into fine beautifully pectinate segments forming a circle, on the posterior side of which there is a short cylindrical filament with a pale apex. *Branchiæ* encircling the body in numerous arbuscular tufts connected by a lower fringe of the same kind. Sides of the body smooth or granular, the anterior vent protuberant, the posterior smaller and somewhat lobed. *Foot* watery white, oblong,

* Formed from *Triton*, the name of the trumpeter to Neptune. It rather unfortunately happens that *Tritonia* is, however, one of the names of *Minnerva*; and *Triton* has been too frequently honoured by zoologists.

† “Les tentacules eux-mêmes ont la forme de panaches composés de cinq plumes, déchiquetées comme les feuilles des fougères.”—*Cuvier*.

tapered behind, plane.—The structure of the tongue is wonderfully fine, and forms an excellent object for the microscope.

Tritonia Hombergii of Blainville, Man. de Malacologie, p. 487. pl. 46. fig. 6. is either distinct or very badly drawn.

2. *T. arborescens*, branchial tufts distinct, five or six on each side; oral veil in four arborescent lobes.

Tritonia arborescens, Cuv. Mém. vi. 28. pl. 1. fig. 8—10. Fleming in Edin. Encyclop. xiv. 619. Lam. Anim. s. Vert. vi. i. 301. Edin. Phil. Journ. ix. 251. Grant in *ibid.* xiv. 165 and 185. Flem. Brit. Anim. 284. Stark, Elem. ii. 68.—*Doris arborescens*, Mull. Zool. Dan. Prod. 229. Fabr. Faun. Grænl. 316. Turt. Gmel. iv. 79. Bosc. Vers. i. 112.—*Doris cervina*? Turt. Gmel. iv. 78.—*Tritonia cervina*? Bosc. Vers. i. 106.

Hab. Frith of Forth, Dr. Grant. Loch Broom, Ross-shire; and Zetland Isles, Rev. Dr. Fleming.

DESC. "Length about an inch; foot narrow, sides compressed; cloak smooth, its margin above the mouth with four plumose appendages; branchiæ decreasing in size towards the tail; tentacula conical, transversely striated; the sheath with a divided margin.—I have found this species in the Zetland Isles, agreeing with the characters of Cuvier, with this difference; that the branchiæ in his are only five on each side, while in our specimen there appeared to be six. But as the two posterior ones are very small, and as his examples were preserved in spirits, it is probable that they have escaped detection." Rev. Dr. Fleming.—Dr. Grant has noticed this species to emit at intervals a peculiar and very audible sound. "The sounds," he says, "obviously proceed from the mouth of the animal; and at the instant of the stroke we observe the lips suddenly separate, as if to allow the water to rush into a small vacuum formed within. As these animals are hermaphrodites, requiring mutual impregnation, the sounds may possibly be a means of communication between them; or if they be of an electric nature, they may be a means of defending from foreign enemies, one of the most delicate, defenceless, and beautiful gasteropods that inhabit the deep."

3. *T. plebeia*, branchial tufts distinct, five or six on each side; oral veil entire, sinuate in the middle, the margin tentacular. Plate III. fig. 3—4.

Tritonia plebeia, Johnston in Edin. New Phil. Journ. v. 77.

Hab. Amongst corallines in deep water. Coast of Berwickshire, not uncommon.

DESC. *Body* oblong, tapered behind, one inch in length, three or four lines broad, grey, marked with brown and freckled much in the same way as the common slug; the back flat, obscurely tuberculated; the sides abrupt. *Mouth* overhung with a semicircular veil, the margin of which is cut into seven tentacular processes, of which the lateral ones are the longest. *Tentacula* exertile from wide entire circular sheaths, columnar, white, the apex yellowish and cleft into narrow pinnatifid segments. *Branchiæ* arborescent, small and not much divided, separate, the tufts five or six on each side, the first and last pairs minute. *Foot* white, oblong, plain.

The *Tritonia pulcra* described in Edin. New Phil. Journ. v. p. 78. is probably a variety of this, distinguished by the red colour of the body, which is marked across the back with three narrow whitish bands, and speckled with minute ocellated dots. I have never met with a specimen but the one from which the original description was taken, and further experience has taught me that colour is far from constant in these animals. I have seen specimens of *T. plebeia* of a whitish colour, either uniform or marked with spots of milk-white opacity.

3. MELIBEAE*, *Rang*.

CHARACTER. *Animal* limaciform, the mouth overhung with a veil: *tentacula* two, dorsal, filiform, retractile within wide sheaths: *branchiæ* in separate mucronated or tuberculated masses placed in a single row along each margin of the back: *foot* linear-oblong, tapered posteriorly, plane: *vents* as in *Tritonia*.

1. *M. pinnatifida*, branchial masses in eight or nine pairs.

Tritonia pinnatifida, Cuv. *Règ. Anim.* iii. 53. *note*. *Fleming in Edin. Encyclop.* xiv. 619. *Flem. Brit. Anim.* 284. *Johnston in Mag. Nat. Hist.* viii. 61. *fig.* 4.—*Doris pinnatifida*, *Montagu in Linn. Trans.* vii. 78. pl. 7. *fig.* 2, 3. *Turt. Brit. Faun.* 134. *Penn. Brit. Zool.* iv. 83. *edit.* 1812.

Hab. In deep water amongst corallines. Coast of Berwickshire.

* *Melibeæ* is the name of a maritime town of Thessaly, famous for its purple dye, and undoubtedly is the original of Rang's name for this genus.

DESC. *Body* half an inch in length, linear-oblong, yellowish brown but variable in marking; the back plane, with a few distant tubercles; the foot tapered to a point behind. *Branchiæ* eight or nine on each side, ovate, muricate, affixed by a narrow base, the three hinder pairs small. Veil above the mouth enlarged, truncate, entire. *Tentacula* long and filiform, protruded from a wide trumpet-shaped sheath uneven on the margin.

2. *M. coronata*, branchial masses in 4—6 pairs. Plate III. fig. 5—8.

Doris coronata, *Turt. Gmel.* iv. 78.—*Tritonia coronata*, *Lam. Anim. s. Vert.* vi. i. 305. *Bosc. Vers.* i. 107. *Grant in Edin. Phil. Journ.* xiv. 185.

Hab. In deep water amid corallines. Frith of Forth, *Dr. Grant*. Coast of Berwickshire.

DESC. *Body* from three to four lines long, limaciform, of a buff-orange colour, sometimes very pale, clouded and freckled with pink and reddish brown. *Mouth* with an entire semi-circular veil. *Tentacula* filiform, extruded from wide open sheaths. *Branchiæ* four or five pairs, very beautiful and large in proportion to the body, subpediculate, pyramidal, muricate; there appear to be about fifteen papillæ to each of the larger masses, and each little papilla has a dark eye-like spot on its apex: the posterior pair of branchiæ are minute, and the anterior pair are less than the second. One of the most lovely mollusks I have ever seen. In one specimen, fully as large as the others, there were three pairs of branchiæ only; in another smaller specimen four pairs; and in one individual the spots on the apices of the papillæ were scarcely visible. The papillæ are covered with vibratile cilia, and hence appear roughish under the microscope.

Not having seen Bommé's figure of *Doris coronata*, the synonyms may be considered doubtful, but the specific character of Gmelin seems very descriptive of our animal: "*D. lactea*, subtus hyalina; papillis dorsi rubro punctati pyramidalibus utrinque sex apice rubris." From its similarity to the preceding, one is tempted to conjecture that this may be its young, but there are no certain data to determine the fact. I found about a dozen specimens which had concealed them-

selves in a tuft of *Plumularia Catharina*, and they only differed in the intensity of their colouring, yet they were mature, if the capability of propagating the species is a proof of that state. The spawn was wrapt round the stalks of the coralline in a white spiral gelatinous mass full of imbedded ova.

Cuvier referred these species to the genus *Tritonia*, but the structure of the tentacula and branchiæ seem too dissimilar to warrant such a collocation. Rang has suggested their relation to *Melibeia*, and I have followed this suggestion, giving accordingly a greater latitude to his generic character; but, perhaps, the preferable plan would be to form them into a new genus.

4. EOLIDIA*, Cuvier.

CHARACTER. *Animal* limaciform: the *foot* linear-oblong, tapered behind, plane: *mouth* with a pair of thin corneous jaws: *tentacula* 4—6, non-retractile, two of them labial, simple, elongate, conical, the dorsal subannular: *eyes* two, sessile at the bases of the dorsal tentacula: *branchiæ* in the form of elongated papillæ arranged along the sides or on the back in series: anal and generative vents placed forwards on the right side. *Cuvier, Règ. Anim.* iii. 55. *Lamarck, Anim. s. Vert.* vi. i. 301. *Rang, Man.* 127. *Blainville, Malacol.* 486.

1. *E. papillosa*, branchiæ numerous, papillary, covering the sides in several series: tentacula four.

Doris, Baster, Opus. subs. i. 81. *tab.* 10. *fig.* 1, copied into *Encyclop.*

Method. pl. 82. *fig.* 12.—*Limax papillosus, Lin. Syst.* 1082.—*Doris papillosa, Mull. Zool. Dan. Prod.* 229. *Fabr. Faun. Græcl.* 315. *Turt.*

Gmcl. iv. 78. *Montagu in Lin. Trans.* xi. 16. *pl.* 4. *fig.* 3. *Stew. Elem.*

i. 387.—*D. vermigera, Turt. Brit. Faun.* 133.—*Tritonia papillosa, Flem-*

ing in Edin. Encyclop. xiv. 619. *Bosc. Vers.* i. 105. *Jameson in Wern.*

Mem. i. 556. *Penn. Brit. Zool.* iv. 81.—*Eolida papillosa, Flem. Brit.*

Anim. 285. *Edin. Phil. Journ.* viii. 295.—*Eolis Cuvieri, Stark, Elem.*

ii. 69.—*Eolidia papillosa, Johnston in Mag. Nat. Hist.* viii. 376. *fig.* 35.

Hab. Among sea weeds, near low water. Leith shore, *Prof. Jameson.* Bell Rock and Isle of May, common, *Dr. Fleming.* Coast of Berwickshire.

DESC. *Body* between two and three inches in length, and more than half an inch in breadth, limaciform, narrowed at the tail, of a freckled purplish-brown colour with grey or

* Formed from *Æolis*, applied to females descended from *Æolus*. *Lamarck* more properly used *Eolis*.

cream-coloured shadings, the brown disposed in some places in darker patches. Middle of the back naked; the smooth space divides the branchial processes, which are very numerous and arranged in close indistinct rows along the sides, sloping backwards; they are slightly compressed, lengthened, unequal, those next the foot being the shortest. When examined narrowly, they are seen to be mottled by the configuration of their interior structure, and when compressed between plates of glass it will be found that there is always a transparent circular spot at the apex. *Head* depressed; the *mouth* terminal, subinferior, encircled with a dilatable lip, and furnished interiorly with a pair of rather large thin oval corneous jaws, twisted into a tooth-like process at the apex, so that they somewhat resemble the shell of a *Sigaretus*. Tongue armed with numerous rows of transverse narrow corneous laminae finely pectinated on the free margin. *Tentacula* conical, nearly equal, very contractile; the inferior originating at the sides of the mouth; the superior placed on the back, and annularly wrinkled. From the bases of the inferior a dark line runs backwards to the superior tentacula, and forms a triangular mark above the mouth, but this is often absent. In the centre of the back there is a tumid spot, indicating the position of the heart, the pulsations of which are often very perceptible. *Foot* watery white, with a thin rather broad undulating margin, prolonged at the anterior angles into an acute process.

This curious snail crawls slowly, feeling its way with the inferior tentacula. The superior cannot be used for this purpose, but they are in constant motion during the animal's progress, and appear to be of essential service; they are often shortened, so as to appear like mere tubercles, but there are no sheaths for their recession and protection. If the finger is placed in the plate, about an inch before the creature, when active and creeping, it will stop, turn back, and agitate the tentacula, and then pass on to a side. The *faeces* are discharged in pellets, like those of mice; and when the animal is dying, a small quantity of an orange fluid sometimes escapes from one of the lateral apertures. It is not common in Berwick Bay, but in spring a few specimens may generally be

found lurking under stones between tide-marks. They seem to have left the deeper water to shed their spawn, which is laid on the under side of stones, in white gelatinous masses, each mass being formed of a chain-like or beaded thread, convoluted in every direction, and firmly attached by a colourless jelly. If unravelled, the chain would measure several inches, but the separate links are only about one-tenth or one-eighth of an inch long, and contain, each of them, numerous ova. These are roundish or oval, with a rough irregular outline; two, or at most three, contained within their own little pellicle of jelly, which again lies immersed in the common mass.

2. *E. Cuvierii*, branchiæ numerous, papillary, clothing the sides rather irregularly; tentacula 6. Plate III. fig. 9—11.

Eolide, *Cuv. Mém.* vi. 26. *tab. fig.* 12—15.—*Eolis Cuvierii*, *Lam. Anim. s. Vert.* vi. i. 302. *exclus. syn.*

Hab. Berwick Bay, rare.

DESC. *Body* limaciform, upwards of an inch in length when extended, tapered to a fine point posteriorly, convex and rounded dorsally, naked along the middle, the sides covered with rather long branchial papillæ arranged in transverse series: the prevailing colour is a rose-red (proceeding from the viscera shining through a transparent skin), with clearer patches and a line of white irregular spots running along the back from the one extremity to the other. *Head* subtruncate, depressed, the mouth with a pair of long setaceous tentacula on each side, of a watery-white colour with milk-white tips: the *dorsal tentacula* rather shorter than the oral, somewhat annulate, olivaceous with yellowish tips. *Eyes* two, placed behind the base of the dorsal tentacula. *Branchial papillæ* of a uniform rose-red, subclavate, unequal, collected in about eleven imperfect clusters (about six in each cluster), set transversely on the sides, and of which the foremost forms a sort of ruff behind the dorsal tentacula. *Foot* narrow, linear-oblong, with a plain free pellucid undulating margin, the anterior angles produced into tentacular points.

This is a beautiful delicately coloured species, more active than its congeners, creeping along the bottom of the vessel, or swimming in a reversed position with great elegance and

ease, while it seems to feel its way with the oral tentacula. Sometimes it will fix itself by the tail, which it has the power of contracting into a sort of disc, and will thus hang with the rest of the body at freedom. The branchiæ readily fall off, and it is then curious to see them move through the water here and there like living independent worms, propelled by the motions of the cilia which clothe their surfaces. The spawn is deposited in summer on the under side of stones, in long threads of a milk-white colour laid in circles.

I can scarcely doubt the identity of this *Eolidia* with the *Eolide* of Cuvier*, for the slight differences which may be pointed out between our figures and descriptions may be reasonably ascribed to a difference in the circumstances in which they were made,—his from specimens preserved in spirits, mine from the living mollusks. In the disposition of the branchiæ our species makes a close approximation to the genus *Montagua* of Fleming, the *Carolina* of other authors; and the fact is perhaps sufficient to prove that those naturalists act more judiciously who unite them in one. *E. Cuvierii*, however, cannot be regarded as synonymous with any species described by Cavolini or Montagu, although nearly affined to the “*Spezie di Limache*” of the former†, and to the *Doris longicornis* of the latter‡. Like them it has the anterior angles of the front of the foot greatly produced, so that they resemble tentacula with a slit along the inferior side, and hence the species are characterized as having six tentacula; but in reality they have four only, and the prolongation of the angles of the foot is observable to a lesser extent in all the genus.

3. *E. rufibranchialis*, branchiæ numerous, papillary, clothing the sides rather irregularly, of a scarlet colour with white apices; tentacula 4.

Eolis rufibranchialis, Johnston in *Mag. Nat. Hist.* v. 128. fig. 85.—*Eolidia Embletoni*, Johnston in *ibid.* viii. 378. fig. 36.—*Doris pedata*? Montagu in *Linn. Trans.* xi. 197. pl. 14. fig. 2.—*Eolida pedata*? *Flem.*

* *E. Cuvierii* of Blainville, *Man. de Malacologie*, p. 486, pl. 46 *bis*. fig. 8. is a totally distinct species.

† *Pol. Mar.* 190. tav. 7. fig. 3.

‡ *Linn. Trans.* ix. 107. pl. 7. fig. 1.

Brit. Anim. 235.—*Doris auriculata*? *Mull. Zool. Dan. Prod.* 229. *Turt.*

Gmel. iv. 78.—*Tritonia auriculata*? *Bosc. Vers.* i. 106.

Hab. Among corallines in deep water. Coast of Berwickshire, frequent.

DESC. *Body* half an inch long, limaciform, truncate in front, gradually tapered to a point behind, of a white colour sometimes tinted with rose-red. *Tentacula* four, equal or nearly so, conical, rather long, the posterior pair wrinkled. *Eyes* minute, one at the base of each dorsal tentaculum, and before these organs there is a dusky spot (sometimes scarcely visible), produced by the opacity of the oral apparatus, which consists of a pair of large corneous jaws and a filiform spinous tongue. *Branchiæ* numerous, elliptic-oblong, round, arranged in three or four imperfect rows on each side, sometimes continuous, or divided at intervals in other specimens into four companies or patches, the first separated by a distinct naked space from the second, the others almost coalescing; they are of a fine scarlet colour, with white apices which appear to be perforated, and can be protruded into a conical point. *Foot* watery-white, enlarged and rounded in front, where the corners are produced into acute angular points.

A more extended experience in the examination of these animals has convinced me that *E. rufibranchialis* and *Embletoni* are the same species; and I much suspect that this will be found identical with the *Doris pedata* of Montagu, though his figure represents the branchiæ collected in separate bundles more distinctly than I have ever observed them to be. The colour is variable, either white and opaque or almost transparent, or tinted with rose-red, or freckled with brown; and the branchiæ are sometimes reddish-brown, rose-coloured or scarlet on the upper part, the tips only being white. It is a beautiful species, and apparently abundant in our seas.

4. *E. purpurascens*, "five bundles of branchiæ on each side; tentacula linear." *Fleming*.

Eolida purpurascens, *Flem. Brit. Anim.* 285. *Flem. Phil. Zool.* ii. 470. *pl.* iv. *fig.* 2.

Hab. "Frith of Tay," *Dr. Fleming*.

DESC. "Length about an inch, slender, pointed behind, rounded in front, of a pink colour. *Anteal tentacula* shorter

than the superior ones, which have the eyes behind. Three filiform branchiæ in each bundle." *Fleming*.

5. *E. plumosa*, "a single row of simple linear branchiæ on each side." *Fleming*.

Tritonia plumosa, *Fleming in Edin. Encyclop.* xiv. 619.—*Eolida plumosa*, *Flem. Brit. Anim.* 285.

Hab. "In Zetland," *Dr. Fleming*.

DESC. "Length about half an inch. The superior tentacula pinnated towards the dextral extremity; the front ones simple." *Fleming*. The structure of the tentacula is peculiar.

6. *E. despecta*, branchial papillæ three on each side in a single row; tentacula four.

Eolida despecta, *Johnston in Mag. Nat. Hist.* viii. 378. *fig.* 35 e.

Hab. Berwick Bay, between tide-marks, rare.

DESC. *Body* two lines long, limaciform, watery-white, truncate anteriorly. *Tentacula* simple, cylindrical, the dorsal long, the inferior much shorter. *Eyes* two, distinct, placed behind the bases of the superior tentacula. Back with three pairs of clavate branchiæ, the two first pairs large and nearly equal, the posterior minute. *Foot* linear-oblong, tapered behind.

Dr. Grant mentions the *E. peregrina* as a native of the Frith of Forth (*Edin. Phil. Journ.* xiv. 185), but no description, derived from a native specimen, has been published. Its character as given by Lamarck is: "*E. corpore lacteo; cirrorum ex fusco cœruleorum in dorso seriebus decem;*" and a good figure of it is given by Cavolini, *Pol. Mar.* p. 206. *tav.* 7. *fig.* 3, which, however, is somewhat at variance with the above character. The branchiæ are arranged in only six rows *across* the back; and the head is furnished with six tentacula, of which the two anterior are the longest.

TRIOPA*, *Johnston*.

CHARACTER. *Animal* limaciform, acephalous: *mou*th without feelers: *tentacula* dorsal, two, short and imbricate: *branchiæ* in the form of short papillæ or tubercles irregularly disposed on the sides and back, non-retractile, simple: *foot* oval or linear-oblong, plane.

* The name of a son of Neptune.

1. *T. claviger*, body ovate, the back ornamented with scarlet tubercles, the sides with a series of short cylindrical papillæ tipt with orange.

Doris clavigera, Mull. Zool. Dan. Prod. 229. Zool. Dan. tab. 17. fig. 1—3. *Turt. Gmel.* iv. 77.—*Tritonia clavigera*, Bosc. Vers. i. 104. pl. 3. fig. 2. pessima.—*Tergipes pulcher*, Johnston in Mag. Nat. Hist. vii. 490. fig. 59.

Hab. Berwick Bay, in deep water, rare.

DESC. *Body* half an inch long, ovate, soft, white ornamented with scarlet tubercles scattered over the back, and with short cylindrical processes tipt with bright orange arranged round the sides. *Mouth* subinferior, terminal, with a linear-oblong membranous tongue set with minute prickles in close transverse series. *Tentacula* two, dorsal, non-retractile, short, oval, imbricate, orange-coloured. *Back* plane, studded with many scarlet unequal tubercles, some of which, when magnified, appear ocellated. Towards the tail are three short white processes placed in a line across the back, which are also not retractile; and there are eighteen short obtuse branchial processes placed on the margins, the smallest in front, and all tipped with orange. *Foot* oblong with plain margins. *Aperture* of generation lateral and anterior.

When viewed through a magnifier this pretty mollusk has a roughish or flocculent appearance. Its motions are slow. The cloak contains numerous calcareous spicula interlaced in every direction, the spicula of unequal sizes, curved, with a sort of knob in the centre, whence it tapers to either end, the points of some of them being forked. The latter sort are abundant in the branchial processes, and the forked end is always pointed outwards.

Cuvier referred this remarkable species with doubt and hesitation to *Tritonia*; and with repugnance I placed it first with *Tergipes*; but the emaxillary mouth, the structure of the skin, full of spicula, and the *facies*, point out its true relations to be with *Doris*. It is unquestionably the type of a new genus, which I have attempted to characterise rather loosely, that it may embrace the following equally anomalous molluscum.

2. *T. nothus*, body limaciform, variegated with black, yel-

low and red; back with some scattered branchial papillæ. Plate II. fig. 14—16.

Doris quadrilincata?? Mull. Zool. Dan. tab 17. fig. 4—6.

Hab. On oyster shells from Prestonpans Bay.

DESC. *Body* limaciform, three lines long, convex dorsally, truncate in front, tapered and somewhat keeled posteriorly, variegated with black, yellow and red disposed in lines and circular patches in an arcular fashion. *Mouth* inferior. *Tentacula* two, dorsal, short and ovate, imbricate, contractile. *Eyes* none. *Cloak* closely fitted to the body without any expansions, but raised into a narrow crenulate fold along each side, with three pale papillæ on it about half-way between the head and tail, and a few smaller papillæ on the medial line above the tail. *Branchiæ* in the form of two ovate papillæ smaller than the tentacula, placed about the middle of the back, of a dark colour with yellow apices. *Foot* flesh-coloured, oblong.

This beautiful animal has a more coriaceous skin than any of its order, and is remarkable for the darkness as well as for the disposition of its colours. Its motions are slow, and I rarely saw it swimming in a reversed position as most of the Nudi-branchiæ are fond of doing. A considerable number of calcareous spicula enter into the composition of the cloak or skin: they are simple, slightly curved, cylindrical, rounded at each end. The red patches of colour depend on the viscera, and may be expected to vary according to the nature of the food and the animal's state of repletion.

EXPLANATION OF THE PLATES.

PLATE II. Fig. 1. *Doris tuberculata*, the figure taken from a small specimen.—Fig. 2. The same seen from below, with the penis protruded.—Fig. 3. The dorsal tentacula as seen through a common magnifier.—Fig. 4, 5, 6. *Doris obvelata* in various positions.—Fig. 7. A branchial leaflet as seen through a magnifier.—Fig. 8. *Doris bilamellata*, in three positions, of the natural size.—Fig. 9. *Doris pilosa*, natural size.—Fig. 10. The branchial leaflets as seen through a magnifier.—Fig. 11, 12, 13. *Doris Barvicensis*, in three positions.—Fig. 14, 15, 16. *Triopa nothus*, in three positions, the figures all greatly enlarged.—(Fig. 15. is reversed on the Plate, as is also fig. 12.)


PLATE III. Fig. 1. *Tritonia Hombergii* of the natural size.—Fig. 2. The same seen from below, from a smaller specimen.—Fig. 3, 4. *Tritonia plebeia* of the natural size.—Fig. 5, 6, 7, 8. *Melibeia coronata*, in different positions: the three last figures magnified.—Fig. 9, 10, 11. *Eolidia Cuvieri*, of the natural size.

XII.—On the Genus *TORREYA*.

By G. A. W. ARNOTT, Esq., LL.D.

LAST winter I was so fortunate as to receive from my friend Dr. Torrey of New York a fragment of the *Torreya paniculata* of Sprengel. According to Sprengel's remarks in the Neue Entd., (1821.) ii. p. 121, the peculiar features of this genus would seem to be that it has a spreading five-lobed calyx, a tubular corolla, five greatly protruded stamens inserted on the tube of the corolla, a superior ovary concrete with the corolla, a long slender style, and a simple stigma; that in the artificial system it is next to *Cestrum* and *Sessea* (among the *Solaneæ*), but in the natural arrangement is nearest *Salpianthus*, among the *Nyctagineæ*. If the description given were correct, the genus would certainly be a very distinct and remarkable one; the insertion of the stamens would at once prevent its being placed in *Nyctagineæ*, and would seem to remove it to the *Corollifloræ*, while again the cohesion of the ovary with the corolla would appear to indicate that the latter was the only perianth, that the ovary was inferior, and the supposed calyx a bractea; and consequently the situation of *Torreya* ought to be among the *Monochlamydeæ Peristamineæ*.

Such at least were the contradictory opinions I had formed of the genus; but now that I have had it in my power to analyse it, my observations lead to a different result. Sprengel describes the calyx and corolla with sufficient precision: these two are, however, scarcely glandular, but, as well as the whole panicle, are more or less clothed with a hoary pubescence. The stamens when moistened become spirally twisted, and are inserted on the corolla, as he says; but what is important, there are only four, not five, and they are didynamous and slightly scurred. The place for the genus is then in *Didynamia*, not in *Pentandria*. The style is deciduous and simple, but the stigma is decidedly bifid, the lobes short, subulate, and unequal. The ovarium does *not* adhere to either the calyx or corolla, but is perfectly free and somewhat fleshy. In the young state, in which alone I have it to examine, it is one-celled: there are two opposite dissepiments which almost meet

in the axis, but then divide into two divaricating branches, like the top of the letter T (thus $\text{+}\Xi\text{+}$), which branches become involute, and have each a single ovule attached to their extremity. Thus the *Torreya* belongs to the Corollifloræ, and has four didynamous stamens and an ovarium with four ovules, a circumstance which Sprengel must have entirely overlooked. Of the two orders, *Labiata* and *Verbenaceæ*, which contain genera with these characters, it is obviously most allied to the latter, on account of the nearly equal lobes of the corolla. But this order (as well as the *Labiata*) has a four-celled, not *unilocular* ovary; this however does not appear to be of any consequence, and is more a difference of words than of facts; for, from the proximity of the extremities of the two half dissepiments, the parallelism of the divaricating branches, and the fleshy nature of the ovarium, it is highly probable that in a more advanced state the approximate parts would either cohere, or have the interval filled up with a fleshy substance. The ovaria of all the drupaceous *Verbenaceæ* which I have examined exhibit the same structure, which is distinctly described by Roxburgh in his *Flora Indica*, iii. p. 67, where he says of *Siphonanthus hastatus*, "germ four-cornered, *seemingly four-celled*, with one ovulum in each lobe attached to the concave side of the wings of the parietal fungiform receptacle *meeting in the centre but not uniting, hence seemingly four-celled.*" The same structure is readily traced in the mature fruit of *Clerodendrum Siphonanthus*, Br. (*Siphonanthus Indicus*, L.), where the shell of each nut or pyrena is not of one solid piece, but is a convolute lamina formed of the inner wall of the drupe, the dissepiment, and one of its divaricating involute branches; or, to speak more philosophically, it is the convolute half of one of the two carpellary leaves, thus  of which the ovary and fruit is composed.

Sprengel's *Torreya*, then, belongs to the *Verbenaceæ*, and the enlarged calyx, tubular corolla, with an equally five-lobed limb, much protruded stamens and style, bifid and acute stigma, as well as the structure of the ovary, point out its identity with *Clerodendrum*: it belongs to Mr. Brown's first section, but I have seen no species that agrees with it in the inflorescence and size of the flowers (about half an inch long),

and Sprengel's description of the foliage is too imperfect to permit of its being referred with certainty to any described species. It approaches most to one in Sir W. J. Hooker's herbarium from the east coast of South Africa. Sprengel mentions that it was collected by M. Perrin in Brasil: Dr. Torrey, who sent it to Sprengel, informs me that this must be a mistake, as M. Perrin only botanised in Guadaloupe and the neighbouring islands.

About the same time that I received the above-mentioned specimen, Dr. Torrey wrote me as follows:

"Did I tell you of a beautiful and new Taxoid tree from Middle Florida? It was discovered about three years ago by my esteemed friend H. B. Croom, Esq., of Tallahassee. Although so abundant about Aspalaga that it is sawed into planks and timber, no description of it has hitherto been published. A small specimen, without flowers or fruit, which Mr. Croom, soon after he discovered the plant, sent to Philadelphia, was seen by Mr. Nuttall, who supposed it was the *Taxus montana*, or *Podocarpus taxifolius*, Rich., and he inserted a very brief notice of the plant in the 7th vol. part i. of the Journal of the Philadelphia Academy. I received a duplicate specimen from Mr. Croom about the same time; but it was impossible for me to determine the plant without the organs of fructification. About a year afterwards I received the male flowers, and more lately Mr. Croom kindly sent me the fruit preserved in spirits. It is evidently one of the *Taxineæ*, (belonging to Richard's second subdivision of the family, with erect flowers,) and must form a new genus: it differs from *Podocarpus* by the erect fertile flowers, and from *Taxus* by the want of the fleshy enlarged cup or disc in which the seed of that genus is immersed, and by the anthers being four-lobed and dimidiate, and inserted by a pedicle on an axis which is at length elongated. It is a tree of from six to eighteen inches in diameter, and from twenty to forty feet high, with numerous spreading branches, the ramuli dividing trichotomously: its appearance at a distance is not unlike that of *Pinus canadensis*. The wood is dense and close-grained, heavy for one of this family, and in old trees of a

reddish colour, like that of *Juniperus virginianus*: it is of a strong and peculiar odour, especially when bruised or burned, hence it is frequently called, in the country where it grows, 'stinking cedar;' it makes excellent rails, and is not liable to the attack of insects. A blood-red turpentine, of a pasty consistence, flows sparingly from the bark; it is soluble in alcohol, forming a deep clear solution; when heated it evolves a very powerful terebinthaceous, but unpleasant odour. The foliage is much like that of *Taxus canadensis* and *Podocarpus taxifolius*, only the leaves are larger. The ripe fruit, or rather seed, is as large as a nutmeg, with beautifully ruminated albumen, the inflexions of the brown investing membrane penetrating through the white albumen about half-way to the axis; a structure which alone will separate it from *Taxus*, nor indeed has it (so far as I know) been observed in any other of the family. There is no fleshy cup, but the external coat of the seed itself is fleshy or rather leathery, and covers the whole, leaving a minute perforation at the summit. The seed, deprived of its succulent external covering, strongly resembles the gland of a large acorn, as well as the fruit of *Taxus nucifera*, Kæmpf., (figured in Richard's Mem. on the *Coniferae*, tab. 2.) which is larger than any other species of the genus. Indeed I once suspected that this plant (a native of Japan) might prove to be a congener; but, on consulting the figure and description in the work just referred to, I am now convinced that it is very distinct: the albumen is not ruminated, and the testa, or exocarp, is comparatively thin. Richard, who only notices the seeds of this species, says that they were without the fleshy involucre or cupule, neither is there any mention made of it by Kæmpfer, who first described the plant. The fleshy covering may have fallen from the specimen, or Kæmpfer may have overlooked it, for in *T. baccata* and *T. canadensis* it is at first very short, and concealed by the involucreal scales. I have a specimen with good male flowers, one of those distributed by Dr. Wallich, and for which I am indebted to Dr. Lindley; but these agree in every respect with the male flowers of the common species of *Taxus*.

"There is another point of structure in the seed of the Florida plant, to which I have not found anything analogous
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in *Taxus*. On the inside of the shell are two opposite longitudinal ridges, extending from the base to within a short distance of the summit, where they project a little from the side of the shell. The projecting extremity of the ridge is perforated, and communicates obliquely downwards, with a foramen on the external surface of the nut. A bundle of fibres in the parenchyma of the exocarp extends up on each side of the nut, and appears to give off a filament at the external foramen, which passes through the narrow canal and emerges from the orifice at the summit of the internal ridge. Respecting the use of these canals I have as yet been unable to ascertain anything satisfactory."

As I have above pointed out that Sprengel's genus *Torreya* must be reduced, I feel certain that I express the general wish of all botanists that this name be now appropriated to the Florida tree, of which I proceed to give the following description.

TORREYA, Arn.

FLORES DIOICI.

Masc. Amentum primo subglobosum, demum elongatum. Rachis nuda, demum elongata, basi squamis siccis quadrifariam imbricatis bracteata, multiflora. Squamæ staminiferae, pedicellatae, subpeltatae, dimidiatae, hinc antheram 4-locularem pendulam gerentes.

Fem. Amentum ovatum, basi ut in mare bracteatum, uniflorum. Discus carnosus hypogynus nullus. Ovulum erectum. Semen ovatum basi squamis siccis haud grandefactis bracteatum, cæterum nudum, testa crassa extus carnosio-coriacea, intus fibrosa: tegmen crustaceum, durum. Albumen ruminatum. Embryo subcylindricus, brevis; cotyledones connatae.

Arbor. Rami patentes; ramuli distiche furcati. Folia disticha, linearia, rigida, mucronato-pungentia.

1. *T. taxifolia*, Arn., in *Hook. Ic. Plant. v. 3. ined.*—*Taxus montana*, Nutt. in *Journ. Ac. Sc. Phil. vii. (non Willd.)*

Hab. in Florida Media, in collibus calcareis secus ripam orientalem fluminis Appalach prope confluentes Flint et Chattahoochie; et ad Flat Creek influentem fl. Appalach; etiamque ad "Aspalaga" copiose.

Arbor mediocris, undique glaberrima. Rami patentes; ramuli distiche furcati, petiolis decurrentibus angulati. Folia approximata, solitaria, disticha, patentia ad ang. 50-70 grad., brevissime petiolata, petiolo vix semiligneam longo crassiuscula, linearia; 10—15 lineas longa, versus apicem curvilinee-acutata, mucronata, mucrone longiusculo pungenti acutissimo, supra convexiuscula viridia nitida, subtus pallidiora glaucescentia nervo lato utrinque rubro limitato.

MASC. *Amenta* axillaria sessilia, subsolitaria, primo globosa, dein ovalia, demum elongata linearia. *Bractea* inferiores rhombéo-ovatae, obtusiusculæ, mediæ et superiores late ovatae, acutæ ac sensim majores, omnes quadrifariam imbricatæ, convexæ, carinatæ, crassiusculæ, rigidæ, mesophyllo carnosulo. *Rachis* (columna staminum Monadelphorum, *Auct.*) primo brevis et crassa, vix bracteis longior, tandem tenuior exserta ac eas 4—5-plo superant, angulata rufescens, esquamata. Pedicelli apice squamam antheriferam (florem singulum) gerentes, in rachi spiritaliter inserti, primum suberecti, demum horizontaliter patentés graciles attamen breves. *Squamæ* inæqualiter quadrangulatæ, peltatæ, at prope latus posterius affixæ, dimidiatæ. *Antheræ* flavæ, ad latera squamæ anteriora affixæ pendulæ, quadriloculares, loculis liberis contiguïs, primum inter se ac pedicello parallelis, intus dehiscentibus. postea divergentibus.

FÆM. *Amenta* axillaria, sessilia, solitaria vel bina. *Bractea* quadrifariam, arcte imbricatæ iis maris conformes, interiores majores ovulum unicum junius fere omnino involventes. *Discus* hypogynus vel plane nullus vel saltem tenuissimus et obsoletus, ac nunquam per ætatem grandefactus vel carnosus. Fecundatione peracta *bractea* irregulariter imbricatæ evadunt. Tunc etiam *ovulum* erectum ultra bracteam exsertum; ovatum, acutiusculum, subcompressum, (in sicco) caruleum et valde glaucum. *testa* crassa carnosio-coriacea, fibris albis minutis cylindraceis flexuosis laxibus inarticulatis erectiusculis per carnem inspersis; foramen (*exostoma* Mirb.) majusculum, ore inæquali ob testam apice hinc in labium brevissimum incumbentem productam: *tegmen* testæ conforme et secundum ætatem plus minusve: ea brevius eaque basi solummodo cohærens; foramen (*endostoma* Mirb.) minutum *nucleus* ovatus mammillatus summo apice depressus et quasi foraminulatus, tegmine fere dimidio brevior. *Semen* maturum nudum, disco carnosio nullo immersum, ad basin squamis fere immutatis hinc repulsis bracteatum, ovatum vel obovatum, 11-15 lineas longum, 8-11 crassum, apice mammillatum et obscure perforatum: *testa* lineam crassa, extus corrugata, interne carnosio-fibrosa et cellulis cylindraceis vacuis plurimis impleta: *tegmen* (seu endocarpium internum auctorum) oblongum, testæ cavum implens et ea omnino cohærens, apice ostiolo conspicuo perforatum, durum, crustaceum, vix $\frac{1}{2}$ lineam crassum, extus levissimum: *nucleus* tegmini conformis, eoque fere omnino cohærens, apicem versus solummodo liber. Albumen membrana tenui fusca tectum, subcartilagineum, album, rimis ac fissuris flexuosis profundis membrana tegente impletis eleganter ruminatum. *Embryo* in albuminis axi ad apicem situs, rectus, albumine 5-plo brevior subcylindraceus, ad basin (cotyledonum regionem) brevissime bilobus, apice ad radiculam paullo attenuatus. Radicula supera cum albumine cohærens. *Cotyledones* duæ, connatæ, per germinationem discretæ, lineares e basi seminis erumpentes.

The female flowers are decidedly sessile, but the only entire fruit in my possession is with its bractees at the extremity of a pedicle or stalk, which, at about half an inch below the fruit,

is furnished with a few minute imbricated scales, similar to those which surround the ovule when very young: this stalk is thus probably a young shoot.

By those botanists who retain *Taxus* in Monadelphia, and who consider the rachis as the staminiferous column of a single flower, this genus will also be placed there; but the examination of the rachis, or male amentum of *Podocarpus*, indicates that it is composed of numerous flowers.

I shall only further remark, that with regard to the *Taxus nucifera*, to which Dr. Torrey alludes in his letter to me, all the figures and descriptions given by modern botanists appear to be borrowed from Kämpfer (*Am.*, p. 814, t. 815), and Gärtner. The reticulated arillus inserted between the flesh and the nut resembles closely the fibrous part of the testa of *Torreya*. Gärtner remarks: "Corticis baccati figuram et descriptionem a Kämpfero mutuatus sum: videant itaque alii num omnino clausus, anne saltem per maturitatem apice obturatus sit? Arillus, quem ad naturam delineavi, nihil aliud esse mihi videtur quam involucri carnosae membrana interna." But, whatever be the case with respect to the Japan plant, we cannot view in this light the testa of *Torreya*. Gärtner describes and figures the embryo as placed at the base of the albumen; but he does the same in *Taxus baccata*, which we know to be incorrect. Dr. Torrey mentions that the male flowers are those of a *Taxus*; but as his specimens (as likewise those in my herbarium) were collected by Dr. Wallich in Nepal, distributed by him under No. 6054 of his Catalogue, and considered by that eminent botanist as but *doubtfully* the same as Kämpfer's species, we may still look on the true *T. nucifera* as involved in great obscurity, as to both kinds of flowers.

XIII.—On the Genus *Procyon*, with a Description of two new Species. By Prof. F. A. WIEGMANN*.

I HAVE been induced to publish these few observations in order if possible to obtain a more accurate account of the country of the species, which would fix their geographical range, this being one of the main objects of special zoology. The two new

* Extract from Wiegmann's *Archiv für Naturgeschichte*, Part IV. 1837.

species are in the Museum of Berlin, and drawings of them will shortly appear in Prof. A. Wagner's continuation of Schreber's *Mammalia*.

In order to avoid any mistakes I will here give the diagnoses of the five species of Raccoons, with short descriptions, without entering into the various errors of synonym which are found here and there in zoological writings.

1. *Procyon Lotor*.

P. flavescens-griseus, nigro variegatus, pedibus flavescens-griseis, cauda mediocri, laxa, fulvescenti, apice annulisque sex integris fusco-nigris. America septentrionalis.

Length of head and body in male, 2 f. $\frac{1}{2}$ " ; of tail, 10" ; of the head from the point of the snout to behind the ear, 5" ; of the snout from the front angle of the eye to the point of the nose, 2" ; breadth of snout before the ocular cavities, 1" 6" ; at the canine teeth, 1" 1" ; length of ears, 2" 1" . Female : length of head and body, 1 f. 8" ; of tail, 9 $\frac{1}{2}$ " .

Colour of the body yellowish grey with a mixture of blackish brown. The bristles at the basis brown, in their middle yellowish grey, the upper half black, which produces the blackish brown colour upon the back and on the sides. The fur is of a greyish brown ; the band running from the forehead to the tip of the nose, as also that surrounding the eye, are blackish brown. The snout is rather pointed ; the obovate ears are almost half as long as the body.

2. *Procyon Hernandezii*, Wagl.

Albido-griseus, fusco variegatus, pedibus fuscis, cauda mediocri, fulvescente, apice annulisque 6, infra subinterruptis (') fusco-nigris. Patria, Mexico.

Length of the body to the extremity of the tail (in a young animal), 17" ; of the tail, 7" ; of the ear, 1" 6" . The distance between the front angle of the eye and the extremity of the snout, 1" 6" .

Wagler was the first to distinguish this species from the common North American raccoon, to which it is very similar, and to which it had been referred. It differs chiefly by its dark brown colouring of the feet, which in *P. Lotor* are constantly of a dirty whitish grey. A more accurate knowledge of this species is very desirable.

3. *Procyon brachyurus*, n. sp.

Albido-griseus, nigro-fusco variegatus, pedibus griseo-albidis, cauda brevissima, densissime pilosa, fulvescente, annulis 6 confertis, nigro-fuscis,

inferne interruptis, apice extus fulvescenti, medio nigra. Patria, Antillæ?

Distance between the eye to the extremity of snout, 1" 10^{'''}; breadth of snout at the canine teeth, 1" 2^{'''}; breadth of snout before the ocular cavities, 1" 10^{'''}; length of ears, 2" 1^{'''}; length of head, 4½"; head and body, 1 f. 9"; of tail, 5".

I have named this species *brachyurus* from the remarkable shortness of the tail, which is densely covered with close hairs, and is rather thinner than in *P. Lotor*, of light ochre yellow colour, with six bands surrounding the upper surface of the tail, being interrupted on the yellowish white under side, and only indicated by a darker ochreous yellow diagonal spot. The form of the snout is very remarkable, being shorter, thicker, more obtuse and flatter than in *P. Lotor*. This species has the general colouring of the common raccoons.

4. *Procyon obscurus*, n. sp.

Supra e badio nigricans subunicolor, nitore pilorum eximio, infra cinereo-fuscus, pedibus fusciscenti-griseis, cauda mediocri, densa, supra unicolore, subtus cinereo-fusca annulisque nigris sursum evanescentibus semicincta. Patria ignota.

Length of head and body, 2 f. 1" 4^{'''}; of head to behind the ears, 4½"; of ears, 1" 8^{'''}; of snout from the front angle of the eyes, 1" 8^{'''}; of tail, 9¼"; circumference of tail, in middle, 7"; breadth of snout before the ocular cavities, 1" 10^{'''}; at the canine teeth, 1"; length of hind feet, 3¼".

The colour of the upper part of the body dark brown; upon the back of the head, nape, shoulder and fore part of the back more of a black brown; upon the hinder part and crupper, through a mixture of many chestnut-brown hairs, becoming more of a chestnut-brown. The contour hairs of the back black-brown or chestnut-brown, with a very lively lustre. The fur thick, greyish brown. The inside of the ears and their upper exterior edge with whitish hairs. The stripe over the eyes to the cheek a yellow brownish grey. The middle stripe upon the snout, and the cheek spot encompassing the eye, descending to the throat, black brown; sides of snout and chin greyish white, with a yellow brownish intermixture. The fore and hind legs dark brown. The fore and hind feet light brownish grey. The tail is not quite half the length of the body, is cylindrical, covered thickly with hair, and appears from this circumstance thinner than that of the common raccoon. The

upper part is of the same colour as the back, with a mixture of several single long bright fox red hairs; the lower part is greyish brown, surrounded on the upper side by four black bands not quite so distinct, the last of which almost passes into the black end of the tail. The snout is shorter than that of the *Lotor*, without being thicker and broader on that account. The oval ears are shorter, and measure only one third of the length of the head. The fore and hind legs are thinner, more slender than in *P. Lotor*, from which it appears longer legged than the grey species. The soles of the hind feet not bare to the heel, smaller than in *P. Lotor*; the heel covered with hair.

5. *Procyon cancrivorus*, Ill.

Supra cinereo-fulvus, fusco irroratus, subtus albicans, capite nuchaque canescentibus, macula oculum cingente fusco-nigra, parva, in genam haud porrecta, cum opposita supra naribus in rostro medio confluyente, fascia superciliari alba, genis fusciscenti-cinereis, antibrachiis cruribusque fuscis, pedibus digitisque subrasis (parce pilosis) e fusco-cinereis, cauda gracili, griseo nigroque annulata. America meridionalis.

Length of body, 2 f.; tail somewhat above 1 f.

The descriptions which authors have given us of *Procyon cancrivorus* do not at all agree. Compared with *Procyon Lotor* it appears higher legged, as the Prince of Neuwied had already observed in his description of this animal; it has a much shorter ear, shorter claws, and the feet are but thinly covered with hair. The hair of the body is also different; the fur is less developed, the bristles shorter and stiffer: the fore feet between the knee and the foot are dark brown; the four feet are more of a brownish grey. The circumference of the mouth whitish; a white band passes from the forehead over the eye to the cheek. The smallness of the blackish brown mark surrounding the eye, which in the other species descends lower than the cheeks, but in this does not even reach them, besides its mixing on the back of the snout with that of the other side, is especially characteristic for this species, as was already noticed by Fischer. The tail in our specimen has the colour of the back; then follow six black bands, which alternate with as many yellowish white grey bands: its tip is black.

XIV.—On two new Genera of Californian Plants.

By THOMAS NUTTALL, Esq.

ANEMIA*.

Natural Order, SAURUREÆ. Linnæan Class and Order,
HEXANDRIA TRIGYNIA.

Involucrum 5—8 phyllum, coloratum. *Spadix* simplex; floribus hermaproditis bracteatis. *Cal. et Cor.* 0. *Stamina* 6—8. *Styli* 2—4, exerti. *Fructus* cum spadice coalescens. *Capsulæ* uniloculares, 3-valves, apice solo dehiscentes, sub-6-sperma. *Semina* subrotunda, punctulata.—Herba perennis, subaquatica. *Stolonifera*; scapo monophyllo, prolifero, unifloro. Capitula involucreta. *Anemonis facies, unde nomen.*

Anemia Californica.—*Root* perennial, creeping, reddish, possessing the aromatic smell and spicy taste of the *Acorus* and *Saururus*. *Leaves* clustered round the crown of the root, oblong-oval, cordate at the base and rounded at the extremity, smooth and somewhat glaucous beneath, the petioles and scapes pubescent, the *leaves* 3 to 5 inches long and $1\frac{1}{2}$ to 2 broad, with the base of the petiole evidently dilated and sheathing. From the axils of the leaves come forth either stolons or one-flowered scapes; on the latter, about the centre arises a single, amplexicaul, roundish, cordate *leaf*, beyond which the stem or scape sends out a solitary peduncle, and from the same sheathing leaf also issues commonly one or two leaves of an imperfect or restrained stolon. The *involucrum* consists of from 5 to 7 or 8, though most commonly 6, white, roundish-oval, petaloid leaves, that finally fade, after long persistence, into a brownish red colour. The *spadix* is a cylindric cone, covered with flowers, so as, with its involucrum, completely to resemble an *Anemone*; these flowers, as well as the succeeding fruit, are all ingrafted together on the spadix; still each one, consisting of an area of 6 to 8 stamens and 3 to 4 styles, is subtended by a small round coloured bract. *Filaments* very short, and united with the linear-oblong, 2-celled *anthers*. *Styles* long, thickish, subulate, at length diverging. *Capsules, or utriculi*, of a spongy texture when dry, ingrafted together

* There being already an ANEMIA among the Ferns, perhaps ANEMOPSIS might with propriety be adopted by Mr. Nuttall.—Ed.

at the sides, of *one* roundish cell, containing about 6 seeds and without valves, or opening merely by the divergence of the bases of the 3 styles. *Seeds* roundish, subcylindric, punctated and somewhat rough, containing a farinaceous perisperm.

HAB. Springy bogs and open marshes by streams around Sta. Barbara and Sta. Diego in Upper California. This present plant is very nearly related to the *Houttuynia cordata* of Thunberg, differing principally in the coalescence of the fruit with the spadix. Compared with a specimen in the Herbarium of the Academy of Natural Sciences in Philadelphia, the aspect of the flower and leaf, as well as the mode of growth, is also exceedingly similar.

• DIPLACUS.

Natural Order, PERSONATE. Linnæan Class and Order,
DIDYNAMIA ANGIOSPERMIA.

Calyx prismaticus, apice 5-fidus. *Corolla* ringens, 5-fida, lobis subæqualibus plerumque emarginatis. *Stigma* bilamellata. *Capsula* lineari-oblonga, bilocularis, *placenta* (s. receptaculum seminis) lata, demum bipartita, adnata. *Semina* minuta, utrinque subulata.

Frutices *Californicæ*, *Mimulo proximæ*; folia opposita plerumque viscosa.

Diplacus * *punicea*, fruticosa viscosa glabra, foliis lineari-lanceolatis subconnatis vix serrulatis acutiusculis, calycinis laciniis inæqualibus acuminatis; corolla punicea, lobis emarginatis; caule elato ramosissimo. *Nutt. in Bot. Mag.* t. 3655.

A very elegant *shrub*, flowering in its native soil nearly the whole year. Like the other species of the genus, it has altogether the aspect of a *Mimulus*, and one of them has long been known under the name of *Mimulus glutinosus*. The present species is a much taller growing plant, and more of a true shrub. The *leaves* are of a deep green, narrow lanceolate and somewhat acute; the *stems* and *calyx* have also a purplish hue, and the *corolla*, considerably exserted, is of a deep velvety scarlet with shades of pink lake: its lobes are also constantly emarginate.

HAB. In sandy loam by the borders of small winter streams, attaining commonly the height of a man, growing near to Sta. Diego, in Upper California. Flowering in April and May. In cultivation continuing to bloom apparently nearly the whole year.

The generic name alludes to the splitting of the capsule, attached to each valve of which is seen a large placenta, and under its edges are found the slender subulate seeds.

Diplacus glutinosa. (*Mimulus glutinosus*, WILLD.) If the plant now before me (so marked in the Herbarium of the Academy of Natural Sciences of Philadelphia, making formerly a part of that of the late Mr. Schweinitz) be indeed the true species, it is readily known from the preceding by the shorter and wider somewhat obtuse leaves, and particularly by the inferior length of the peduncle, the wider and more obtuse, as well as nearly equal and proportionately shorter calyx. It is probably, however, different, and the plant of Wendland, "*caule hispido glutinoso*," entirely unknown to me, appears distinct from the *M. aurantiacus* of Curtis.

Diplacus * *latifolia* ; suffruticosa, viscosa ; foliis oblongis sublanceolatis obtusiusculis serrulatis, subtus puberulis ; pedunculis brevibus ; calycibus glabris, laciniis inæqualibus acutis ; corollæ lobis vix emarginatis, latis.

Nearly allied to the two preceding, but readily distinguishable from the first by being scarcely more than an under shrub, with broader leaves and larger shorter *yellow* flowers, and with the lobes of the corolla scarcely emarginated. This is also a very showy species, and may also be the *Mimulus glutinosus*, an inadmissible specific name, as all the species of the genus are equally glutinous. In flower round Montersey, Upper California, in April.

Diplacus * *leptantha* ; fruticosa viscosa, foliis oblongo-lanceolatis acutiusculis subserrulatis glaberrimis ; pedunculis brevissimis ; calycibus glabris tubulosis elongatis, laciniis inæqualibus acutis brevibus ; corollæ lobis latis, oblique emarginatis.

Of this very distinct species I have seen only a single good specimen in the Herbarium of the Academy of Natural Sciences of Philadelphia, communicated to the late Mr. Schweinitz by Sir William Jackson Hooker, and marked "*Mimulus glutinosus*, from Mr. Menzies." From all the preceding easily distinguished by the great length of the calyx and flower. The leaves also are more attenuated upon the petiole, perfectly smooth, and unusually thin. The flower of this species is also yellow.

Diplacus * *longiflora*, suffruticosa viscosa pubescens; foliis lineari-lanceolatis utrinque attenuatis, vix serrulatis, margine revolutis, supra glabris; pedunculis brevissimis, calycibus villosis, laciniis vix inæqualibus acutis; corollæ lobis latissimis, oblique emarginatis.

HAB. In rocky places by small streams, in the vicinity of Sta. Barbara (Upper California). A species remarkable for the width and very oblique emargination of the lobes of the corolla, which is of a paler yellow than in any other species, and inclining to a fawn colour. The stems are very leafy, pubescent, and the leaves elongated and acuminate. The base of the calyx is also almost lanuginous. Flowering in April.

THOMAS NUTTALL.

Philadelphia, October 12, 1837.

XV.—*Information respecting Botanical Travellers.*

MR. TWEEDIE'S *Journal of an Excursion from Buenos Ayres to the Serras de Tandil.* (In a Letter communicated by the Author 12th April, 1837.)

On the above day I set out on a botanizing excursion to the Serras de Tandil, a dry ridge of rocky hills, or rather stony heaps, about 300 miles to the south of this city. My excursion would have been made earlier in the season, but domestic affairs prevented me. Mid-day being come before we started, we were able to travel only about sixteen miles, through a country intersected with wretched roads; for there being no material for making roads in this country, every one seeks the best way he can through the flat plains. The first thing which interested us was the sticking fast in a bog of one cart out of six belonging to my guide, a Mr. Methuen of Perth. The peons dug a track for the wheels, whilst eight pair of bullocks were employed to drag it out. After looking at their awkward work, we left them, and proceeded on our journey; and in the afternoon passed some large and beautiful groves of peach and Carolina poplars, the only sort of wood grown in this country. The peach plantations attain the height of from ten to twenty feet in three years, and are then cut down for fire wood. The poplars remain and soon become fine trees: these plantations last for forty years, treated as osiers are in England.

At night we halted at the house of a Mr. Roger, who left Killwin-

ning as a hired servant for the Scotch colony of Montegrande in the year twenty-five, then not possessed of a shilling ; now of a cattle farm stocked with about 600 cattle, more than 100 horses, and a large flock of sheep. The farm is about six miles in circumference, its soil as fine a grass land as one could wish to look upon ; all his own free property, the fruit of his own and his family's industry in that short time. As we quitted his house the next morning, he set out on his usual weekly trip with 107 lbs. of butter, at about 15*d.* per lb. : he says he sometimes takes more than 200 lbs. He has no hired servants ; though the work of managing the wild cows of this country is incredible to strangers.

13th. This day we travelled through a fine flat grassy country, well stocked with cattle and sheep : the land is dry, and the roads better than in the vicinity of Buenos Ayres. We passed through the village of San Vincente, a straggling mass of Panchos of straw and peach wood, coarsely patched with mud, the church of the same materials, but better plastered with mud, and white-washed. This village contains a population of about 2000 inhabitants. The country round, though flat, is beautiful, from the thick interspersing of little villas with which it is dotted. These habitations, each surrounded with a small plantation of figs, peach trees and poplars, make the country appear rich and beautiful, although in themselves they are as miserable as can be conceived. In the rooms there is no furniture, except a kind of cross-legged bed-frame ; for the clothes of the family are contained in a large box which also serves as a dining table. There are seldom more than three or four slender rush-bottom chairs ; the common seats being the skulls of horses or bullocks : these, with an iron pot, and an iron rod stuck into the floor to serve as a spit for the meat, are all the household furniture. Strangers and inmates of the dwelling have no other bed than a hide spread upon the floor. All travellers must carry their bed-clothes with them, or go without. I observed that this is the mode in all parts of the country.

At sunset I came to the house of an Irish merchant, who was the first to set the example of sheep-farming in these formerly cattle plains, having introduced a breed of Merinos from Spain about nine years ago. The success which has attended this attempt has been so great, that a taste for this species of farming has been widely diffused. Joint-stock companies even among mechanics are formed for this object in Buenos Ayres : it is consequently the rage of the day, heightened by the great demand for wool in the English and North American markets. Here I met an acquaintance who had prepared

a few specimens of what he said Signor Bonpland told him were rare plants; one a species of *Cleome*, plentiful near Buenos Ayres, a dwarf *Eupatorium* which I had often seen in the Pampas, and a slender species of *Colutea*, abundant in Banda Oriental; and near this farm I gathered a beautiful purple-flowered perennial *Senecio*, found first in a valley between the hills of Maldonado. Leaving this, the last English stage on a journey of sixteen leagues from Buenos Ayres, with a supply of five fresh horses, on the morning of the 14th, we travelled four leagues through a fine grassy country, containing no variety of herbage. The dry parts of it were beautifully adorned with three or four species of purple and yellow *Oxalis*. We breakfasted at the Guardia de la Monte, in the Pancho of an Italian gardener, whose wife was a daughter of one of the late ephemeral governors of Buenos Ayres. She was now, with her husband, contentedly transplanting onions, of which crop they had several acres. Onions are all transplanted in this country, as they will not thrive in seed-beds.

Leaving this in a S.W. direction, through a country nearly uninhabited, something like the Scottish moors, covered with a species of *Santolina*, called by the natives *Genga Nigro*, from its imparting a black and dismal appearance to a country of hundreds of miles in extent, enlivened only in a few places with flowers of the *Oxalis* and a few species of *Verbena*; in the afternoon we passed some extensive lagunes, on whose shores not a vestige of aquatic plants were seen, on account of the summer drought. About sunset we crossed the Riosolado, or Sollan, as it is pronounced. There we saw what in England would be accounted cruel and wasteful; for the drivers of a herd of about 2000 cattle, which the men, sixteen in number, were conducting to Buenos Ayres, having stopped at the above river for the night, had killed two young cows which had newly dropped their calves. These cows are their favourite food, which they roast nearly whole, just taking out the entrails. They place the whole carcase, with the skin on, over a large fire: thus it lies until they consider it sufficiently roasted, when all hands fall to work with their long knives, satisfying their appetites as fast as they can, without either bread or salt. This they called *carne con cuera*, and a choice feast. The two orphan calves being left strolling in the desert, a flock of buzzards had begun to torment the helpless young creatures and to endeavour to kill them by first picking out their eyes: in this way they destroy great quantities of sheep: even horses are thus killed by these strong and ravenous birds. Having crossed the river, we travelled about twelve miles farther, mostly in the dark, when we arrived at a post-

house or stage; where, if horses are wanted, they are supplied at 1s. per league and 6d. for a pson to take them back; an open Pancho also for a bed-room, and a hide for bed accommodation. This day our journey was but about twenty leagues: we found no specimens except a species of *Hordeum* of the marshes.

15th. The morning was foggy: the peons did not get the horses till near night. About ten we arrived at Arrog Commoron Chico; here I found a pretty kind of *Triglochin* nearly covered with sand from the river. On the bank of this Arrog stood the principal *Estancia* of Signor Angenina, considered the wealthiest landholder of the Argentine republic. Our road continued for forty miles on his land, passing amongst many herds of cattle, also by some of the most beautiful lagunes to be seen, covered with a vast number of geese, swans, two species of flamingo, and a great variety of ducks, one of which is much larger than a well-grown hen, which it resembles more than it does a duck. These are called *Patto de las Serras*, or Mountain Duck: they congregate in very large flocks, and seem to delight to feed on land rather than water. Land birds are also, after passing to the south of the Rio Solado, more numerous, particularly the partridge of the country, of which there are two species, a small and a large. The former is by some called the pheasant. I believe they both belong to the quail genus; they have no tails. The smaller species resembles in shape, size, and colour the Corn Crake of Scotland, and is caught in thousands by the herds on horseback. When approached, they settle close to the ground; the rider then goes three or four times round, closing in nearer each time, and holding in his hand a slender rod with a small lasso at the point, which he throws over the bird's head and plucks it off. Thence he goes a little further distant, where he meets another bird; and in this manner he will take hundreds in one day. The larger kind is caught by running: they rise but twice, fly the first time from fifty to one hundred yards: their next flight is shorter, and the rider galloping soon overtakes them and fells them with sticks. The swans are usually captured by five or six men on horseback, who go together into the shallow lagunes at a spot where they see a considerable flock collected. All birds of this country are so much accustomed to horses and cattle, that they take no heed to them, and are in a manner tamed: thus the riders are enabled to draw close to the swans, who rise in a cloud; when the men shout with all their might, make as much noise as possible, which stupifies the birds, so that they drop into the water, and are killed with sticks.

In this day's long ride we picked up only two species, one *Cleome*

spinosa, an annual, in the marshes of the Laguna Clara; and a creeping syngenesious white-flowering perennial, very conspicuous amongst the black herbage of the *Santolina* formerly mentioned.

At dark we arrived at the Pancho of a friend of Mr. Methuen, where we got a good supper of fowl stewed with pumpkins, a soft food without the addition of bread. There are no mile-stones in this country; but we calculated that we had ridden this day sixty-three miles, with only one change of horses, through fine dry plains and with pleasant weather. The landlord of the house where we stopped was absent in search of his whole flock of sheep, 300 in number, which had been stolen the previous night. On my return I called again, and found that he had regained them, and had sent the thieves, two men and a boy, to the prison of Buenos Ayres.

16th. The morning was thick, foggy, and cold. I sucked two or three mattas for breakfast, and afterwards rode about two leagues through a dry trackless plain, and entered a great marsh said to be ninety miles in length, and varying from two to eight miles in breadth, called Barreado de Bessino. Its herbage was tall *Junci* and coarse species of *Curex*, so tall that a flock of cattle is lost sight of in it: it has a brown and dried appearance. At a spot which we passed, two miles and a half in breadth, though the season was dry, our horses were frequently up to the belly in mud: this marsh is valuable for the breed of the "Coypou?" (*Myopotamus*), thousands of whose skins are sent from this country to Liverpool annually.

At mid-day we arrived at the *Esterancia* of a Buenos Ayres merchant, called Laguna Robino, a beautiful seat on the borders of a fine lake, covered with a great variety of water-fowl. Here they had attempted to grow peaches, willows, and poplars; but these were completely destroyed by the sheep, which are more hurtful to plantations in this country than horses are in Britain: now not a vestige of trees is to be seen in this country. The fire wood of the people is a *Solanum*, a suffruticose species of the marshes, which grows to the height of three to six feet: in naming my seeds I called it *Solanum glaucum*. At dark I arrived at the house of my guide, Mr. Methuen, where I stopped for ten days; in this day's journey I did not see a single new specimen.

Between my going out and coming home, in the marsh which we passed in the morning, two carts were attacked by a band of deserters, and plundered, and the drivers were barbarously wounded. At a post-house, where we changed horses in the afternoon, I met a man whom I had seen in Buenos Ayres, a native of Peterhead, coming to Buenos Ayres from Tandil, in company with a Creole. This Creole attacked

the Scotchman immediately afterwards on the solitary road and murdered him for his trifle of wages, which he had earned by working as a bricklayer at the fortifications of Tandil. So much for the safety of travelling here !

During my ten days' stay I lost no opportunity of riding and travelling through the neighbourhood to the distance of thirty miles in circumference ; yet I did not meet with a single new specimen, except a dwarf *Juncus* and a *Rumex*, with a creeping insignificant grass of the country.

I visited the principal *Estate* of a Colonel Alsega, who keeps an English gardener, but the garden contains nothing more than pumpkins, onions, maize, some good cabbage, lettuce, and turnips, with capsicums and cucumbers : these are the principal produce of the best gardens of this country, with the addition perhaps of a few sweet potatoes, melons, and water-melons in their season. This place is called *Juncus Grandes* from a lagoon west of it, where that species grows very strong. The gardener is more active with his gun than with his spade ; and this fine sheet of water gives him full employment in shooting ducks, geese, swans, and flamingos, with several kinds of land animals, as three species of armadillos, foxes, deer, &c. &c. The latter are seen running over these vast plains unclaimed and little disturbed, though several hundreds may be met with in a day.

This Englishman had promised to preserve me a few rare birds of this place for stuffing. After searching every bog and cave of this neighbourhood, I did not see a single new plant except a dwarf *Rumex*, and a minute anonymous plant plentiful on the shores of LaPerta. In rich moist pastures near this place I saw fields of the *Dipsacus fullonum*.

26th. I left the *Estate* of Mr. Methuen, who was so kind as to accompany me with his own horses and peons as a guide to the Serras, distant twenty-four leagues from his house. The top of the highest of them could be descried on a clear evening rising above the horizon to the height of apparently six or seven feet. Though the whole of this district is as flat as a bowling-green, yet the sight terminates at the distance of from four to five miles : beyond this, every object is lost sight of. It is strange, that though the country is frequently a plain open field, and though the atmosphere is unclouded, neither house, cattle, nor tree is to be seen, although at no great distance.

This day's ride was very uninteresting : great part of it lay through vast tracks of strong coarse grasses as high as our horses. Fortu-

nately our path was, through most of the way, marked out by an old road track ; much of the grass was of the kind which is called *Pocho blanco*, having long white spikes at the head of the flower stems, from four to eight feet in height. At night we came to the *Estanca* of Leon Biga, a wealthy cattle-farmer, who being a friend of Mr. Methuen, supplied us with the best that his house contained ; with plenty of wine and music, which made the night pass more pleasantly than lying upon a hard hide for eight or nine hours.

27th. A pleasant clear morning, and my favourite sight, the mountains, in view, (a reminiscence of home to me, after passing years in a monotonous plain !) distant only about six leagues : we struck across the trackless plains towards the nearest of them, which are a line of dry rocky knolls, lying east and west. The village or *Guardea* lay in the centre, and at about six miles' distance from the spot where we left the horses and climbed the hill on foot. There we found a strange contrast with our former travelling, where not a stone above the size of a pea was to be seen ; whilst here we might almost have been tempted to imagine that the whole Pampas had been cleared of stones to supply this place. The Serras are a tract of low hills and knolls lying sometimes at a mile distant from each other. The principal line runs east and west, but detached from each other like loose stones thrown into heaps of 300 to 400 feet in height, consisting of no solid rock, but blocks of grey granite. The herbage varies little from that of the Pampas : not a tree or shrub was to be seen. The only few plants which I found were three species of *Cactus* ; three of a procumbent slender *Mimosa*, of which two only were in flower ; *Oenothera undulata*, with large fine-scented blossoms, the root leaves long, narrow, and much undulated ; a species of *Nierenbergia*, which is a beautiful dwarf shrubby-like plant with large white flowers, slightly streaked with blue veins ; a *Gnaphalium*, with thyme-like leaves ; and two Ferns : these were the only strangers to be met with at this season. The most interesting plant here is a yellow or straw-coloured *Cynanchum*, flowering during the greater part of the year : on a dry night, when the wind, sweeping over the hills towards the village, passes over this plant, it comes laden with a most delicious scent. We stopped in the village or *Guardea* only three days ; our lodging being in the house of an American *Pulperaro*. Here I met a Scotch gardener who cultivates a piece of ground on which he raises vegetables for the soldiers. He told me that he came from the county of Fife, where he was a fellow-workman with Mr. Drummond : he also met Drummond again on his arrival in the States, and travelled with him there for some time. He seems to be acquainted with a few

plants, and has promised to collect anything interesting as it comes into season in this hilly country : he is familiar here and well known among the Indians, whose villages are numerous amongst the Serras ; so that from him I expect something new, principally in the *Cactus* tribe.

The village, or Guardea de Tandil, is a military station, where is a strong earthen battery, surrounded with deep ditches as a defence against the Indians, who till lately were very troublesome. A little while before we arrived, they had come in a body of about 200, passed two *Estanceas*, and on the third cleared off every animal they found, to the amount of several thousands.

We turned to the north-west along the Arrog de Chapple Aguha, and travelled six miles to the *Estancea* of a Bremen ship-master, who has become cattle-farmer. He has been for nine years in the country, and now possesses a farm of 6000 cattle, 200 horses, and several thousand sheep. This dwelling is strongly guarded by ditches and a battery of three cannon ; being always on the alarm, as attacks and robberies are frequent in this district. On crossing the plain to his house, we came to an Arrog not visible till we were close upon it : when entering it to cross it, we drove in the foremost horse ; but before he entered four yards, he was out of his depth, with our bedding, my specimens, seeds, &c. totally immersed in water.

Having at dusk arrived at the house of the Bremen captain, we found him a hospitable and well-provided bachelor, having everything about him in good European style ; and we shared in his hospitality as freely as if we had been among friends. He said he was always glad to see persons from a Christian country, for he lived almost in the midst of savages, where he considered himself every night in danger of an Indian visit : he is however well prepared for defence. He mounted his horse and accompanied us for a good way the next morning, to put us in the direction homewards ; for road there was none. As I had searched in vain for specimens in the country, which was a plain dry pasture field, I made up my mind to return to Buenos Ayres.

On the 1st of May I left the Arrog de Chapple Aguha for Buenos Ayres. I travelled this day between sixty and seventy miles without seeing a single new plant, through a monotonous, rough, grassy, and in some places marshy plain. At ten at night we arrived at a miserable straw hut, where lodged four cut-throat Gougaas, who gave us a coarse joint of beef to cook for supper ; but, except green weeds, we had no firing. However, having tasted nothing on our day's journey, we were quite ready for supper ; and then we cleared a

corner in the midst of hides, stinking Tollo dogs, &c., where we spread our bedding for the night's rest : sleep we guarded against, as our company did not seem any of the safest. No sooner indeed was the light put out, than we heard one of them examining our luggage ; but when we made a noise to indicate that we were not asleep, he desisted.

Next evening we arrived again at the *Esterrea* of Mr. Methuen, where we rested for a day ; then, with my peon and three horses, I set out for Buenos Ayres, where we arrived after a five days' dull ride, and nearly a month's journey in search of that which was not to be found.

We have been favoured by Mr. Bell with the sight of a letter just received by him from Mr. Cuming at Manilla, and which brings down our intelligence of him to so late a date as Nov. 1, 1837, after having been absent ten months among the southern islands of the Philippines, where he has made a very large collection of Crustacea, which he has forwarded to the Zoological Society and to Mr. Bell ; also five cases of animals for Mr. Owen, including a great number of fish, snakes, lizards, frogs, dragons, and bats. He states also that he has collected 1809 species of shells, amongst which are 300 from the woods, many of them magnificent. It was his intention to leave Manilla in a month for the southern provinces of Luzon and the adjacent islands, for a period of at least nine months.

BIBLIOGRAPHICAL NOTICES.

Molluscos Animals, including Shell-fish ; containing an Exposition of their Structure, Systematical Arrangement, Physical Distribution, and Dietetical Uses, with a Reference to the Extinct Races. Forming the article "Mollusca," in the 7th edition of the Encyclopædia Britannica. By John Fleming, D.D., F.R.S.E., &c. Edin. 1837. 12mo.

During our cursory perusal of this volume we had forcibly brought to recollection some lines of Chaucer, which the lapse of three centuries or so has not rendered the less unfitting.

" For out of the old feldis, as men saieth,
Comith all this newe corne fro yere to yere,
And out of oldè bokis, in gode faieth,
Comith all this newe science that men lere."

And yet the lines are not very applicable to the purpose either, for

the books out of which this little *new* one cometh are of too recent a date to be pronounced *old*. The volume consists of four chapters, of which the first is a republication of that portion of the author's "Philosophy of Zoology," which treated of molluscous animals; which again was a reprint from an article in Brewster's Edinburgh Encyclopædia. Chapter II. is not in the "Philosophy," with the exception of five or six pages; but the matter in its other pages is so familiar to us, that we feel pretty sure of having before read them in some other book: they are probably from the article "Conchology" in Brewster's Encyclopædia, or from the Supplement to the Encyclopædia Britannica, or from both. Chapter III. is also from the fruitful "Philosophy," with one or two trifling interpolations, amendments, and omissions: and Chapter IV. is reprinted from the Supplement to the Encyclopædia Britannica, whether *verbatim* or not we cannot pronounce decidedly, but nearly so. Surely the material must be good that allows so frequent a transfusion! It may be so, and the article may, for all that we know, come up to that standard of excellence by which encyclopædists measure their contributions; but this we are certain of, that as a separate "Treatise" on molluscous animals it is very defective in every point of view. The beginner will read the book with advantage, because the manner in which the subject is treated is a good one,—anatomy and physiology going hand in hand with the systematist and œconomist;—but the further advanced conchologist will find it no more than a convenient and cheap collection of articles he has previously studied.

The Cabinet Cyclopædia; conducted by the Rev. D. Lardner. Natural History. Animals in Menageries. By William Swainson, Esq., F.R.S., L.S. 8vo. London, 1838.

The subject to which this volume is devoted, our author tells us, "is one in which little novelty can be expected;" and we must confess that in all respects it scarcely comes up to the usual standard of the volumes in Dr. Lardner's Cyclopædia. The two first parts are a compilation neatly enough executed, but still a compilation in almost every line, without the least pretence to novelty; and it is a pity that here and there an original remark should be introduced on the unscientific character of the works of Fred. Cuvier, or upon the "careless and ungrammatical" style of that of the venerable Latham, especially as such ample use is made of both the works. These do not contribute to the value of Mr. Swainson's volume, neither do they add to the pleasure of most of its readers. The ornithology of the latter, though not possessing the lucid arrangement which may

be given to the works of the present day, contains an immense mass of information, with descriptions of many of the birds which are now receiving names as entirely new. We must notice one little error in the second part. Speaking of *Clangula Barrovii*, it is said, "We believe only one specimen is in England, and it has hitherto only been found in the valleys of the Rocky Mountains;"—a beautiful male specimen of this rare bird was shot some years since in Iceland by Mr. Atkinson; so that its range is more extensive.

The third part of the work, "Two centenaries and a quarter of birds either new, or hitherto imperfectly described," has no connection with the first or second parts. The short specific descriptions are a little troublesome, from having the species mixed up together, and not generically arranged; and it is less useful than it might be from the want of synonyms; for though many are new, many are also described and indicated in other works: for instance, *Platyrus niger* seems to be *Scytalopus fuscus*, Gould, Proc. Zool. Soc. for 1837; *Rumphapis Melanogaster* is the same with Lafresnaye's *M. dimidiatus*, figured in the *Magazin de Zoologie* in the beginning of the last year; *Aglaia melanotis* is very like D'Orbigny's *Tanagra Schrankii*, &c.; *Crypticus "Superciliosus,"* should be *C. Superciliaris*, at least so Mr. Sandbach named it. Some of the birds again scarcely require to be introduced as little known. *Leistes Suchi*, here called *L. orioloides*, has been at least twice figured, and several times described.

The Edinburgh New Philosophical Journal. Conducted by Professor Jameson. Nos. for April, July, October, 1837. Edinburgh, A. Black and Co. 8vo. (continued from *Mag. of Zool. and Bot.*, i. p. 575.)

APRIL. *Zoology.*

I. *Analysis of Fossil Scales from the old red Sandstone, Clashberrie, Perthshire.* By A. Connell, Esq. The most curious fact in the analysis of these scales is, that the ratio of the phosphate to the carbonate of lime is in the proportion nearly of thirteen to one, and similar to two out of three analyses of recent fish-scales by Chevreul. Of the animal matter there remained only a "trace."—II. *On the organized bodies found in the mixed fluid of Animals, and their analogy to the pollen of Plants.* By G. R. Treviranus. (Taken from Tiedemann and Treviranus's *Physiological Journal*.) The paper endeavours principally to establish the analogy between the fertilizing particles of the productive parts of plants and animals.—III. *Further Observations on the Unity of Structure in the Animal Kingdom, &c.*

By Martin Barry. Additional illustrations of the author's views on this subject.—IV. *On the Development of the Decapodes*. By H. Rathke. This short paper is the contents of a letter written to Professor Müller, and is a rough sketch of observations made by the author on the shores of the Black Sea and at Dantzic. The result of these researches are rather opposite to those of Mr. Thompson: he concludes by saying, "All the *Isopodes*, with whose development I am acquainted, come into the world with fewer bones than they exhibit in their state of maturity. These animals, we can say with justice and reason, enter the world in an extremely imperfect condition; but as to the Decapods, so far as I have examined their development, I must deny such an assertion; and of them I can say nothing less, than at the end of their existence in the egg they have exactly the same aspect, and are as fully developed, as the full-grown individuals."

Botany.

Contributions to the Botanical Geography of Southern Europe, by Professor Link, (translated from Wiegmann's Archiv für Naturgeschichte, 1836,) and Dr. Graham's list of new and rare plants which have flowered in the neighbourhood of Edinburgh, are the only botanical communications.

JULY. Zoology.

I. *On Unity of Function in organized Beings*. By William Carpenter, M.R.C.S., Sen. Pres. of the R. Med. Soc., Ed. A paper of considerable merit, suggested by those by Dr. Barry on the "unity of structure."—II. *Organic Remains in the old red sandstone of Fife*. By the Rev. John Anderson, Minister of Newburgh.—III. *On the Fossil Organic Remains found in the Coal formation of Wardie, near Newhaven*. By R. Patterson, M.D. This paper refers to both the remains of plants and animals. The chief plants are *Filices*, with the genera *Calamites*, *Lepidodendron*, *Lepidophylla*, *Polyperites*, and *Knorria*, besides "many which we have been unable to name." Among the animals are abundance of Entomostraca, belonging to the genera *Cypris* and *Daphnoidea*, and the author considers the occurrence of these two, in conjunction with sea-shells and corallines, as an argument against the fresh-water or lacustrine formation of Burdie-house, as adopted by Buckland and Dr. Hibert from the immense deposit of Entomostraca without any marine productions. Five or six genera of fishes with coprolites are also stated to occur.—IV. *Notice of the result of an experimental Observation made regarding equivocal Generation*. By F. Schulze. An experiment performed with distilled water, mixed with various animal and vege-

table substances. Germs, &c. were destroyed by heat (212° F.), and the introduction of matter was prevented by other contrivances, while the exposure to atmospheric air, light, and heat was continued. Three months produced *no living creature*; but a few days after the inclosed matter had been exposed, many Vibriones and Monades, with "larger polygastric infusoria," were noticed.—V. *On the Sivatherium, a new fossil ruminant genus found in tertiary strata in the Valley of the Markanda, in the Sivalik branch of the Sub-Himalayan Mountains*, contains only remarks from sources already published.—VI. *On the colossal fossil Mammiiferous Quadruped named Dinotherium giganteum*. Extracted from Buckland's Bridgewater Treatise; Blainville and M. Rauss, in the 'Comptes Rendus.'—VII. *Account of the Skull of a Fossil quadrumanous Animal, found in the tertiary rocks of the Sub-Himalayan hills, near the Sutlej*. Extract from Journal of the Asiatic Society.

Botany.

I. *On the condition of Fossil Plants, and on the process of Petrification*. By H. R. Goppert. Translated from Poggendorff's Annalen.—II. *Remarks on the Origin of Amber*. By the same author, and from the same source. The author here considers "that amber is nothing else than an indurated resin derived from various trees of the family of the Conifera; which resin is found in a like condition in all zones, because its usual original depositories, viz. beds of brown coal, have been found almost everywhere under similar circumstances."

OCTOBER. Zoology.

In this number there is little relating to zoology or botany. The only paper which comes under our range is, I. *Analysis of the Scales of the fossil Gavial of Caen in Normandy*. By A. Connel, Esq., F.R.S.E. In the result of his analysis Mr. Connel considers that "these scales were originally of the nature of bone, and in all probability analogous to the osseous bones of fishes;" and he suggests the more detailed inquiry whether the coverings of the extinct and recent Saurians are identical. In the 'Scientific Intelligence' there is a notice by M. Baer, of the Prussian and Polish aurochs being found in the Caucasus. No botanical papers in this number.

PROCEEDINGS OF LEARNED SOCIETIES.

LINNÆAN SOCIETY.

Feb. 20, 1838.—Mr. Forster, V.P., in the Chair.

Read the conclusion of Mr. Hogg's paper on the classifications of the Amphibia.

The author takes a review of the different modes of arrangement that have been proposed for this remarkable class of animals, and he concludes his paper by suggesting the following classification, founded upon the organs of respiration, as the result of his investigation, viz.

Class IV. AMPHIBIA.

Subclass I. MONOPNUMENA.

Order 1. Abranchia. Branchial apparatus *none*.

Family. *Cæcidæ*.

Order 2. Cadnabanchia. Branchial apparatus *decaying*.

Families. *Ranidæ*. *Dactylethridæ*. *Astrodactylidæ*. *Salamandridæ*.

Order 3. Imperfectibranchia. Branchial apparatus *imperfect*.

Family. *Menopomatidæ*.

Subclass II. DIPLOPNEUMENA.

Order 4. Manentibranchia. Branchial apparatus *remaining*.

Families. *Sirenidæ*. *Proteidæ*.

Read also a classified catalogue of Nepalese Mammalia, by Brian Houghton Hodgson, Esq., F.L.S., British Resident at the Court of Nepal.

The catalogue comprises eighty-seven species, of which fifty-five were first made known by the author. The most remarkable feature in the Nepalese Fauna is the large number of native ruminant animals, which amount to twenty-four species, a greater proportion than occurs in any other Fauna, with the exception of that of the Cape of Good Hope.

The following new genera are characterized by the author in the present paper, viz.

Canidæ.

CUON nob. Molars $\frac{6.5}{6.6}$. Odour and aspect of the *Jaculus Indicus*; head blunter, tail and ears larger; teats 12 to 14; soles of feet tufted. 1 Sp.
CUON primævus nob. type. *Canis primævus* of Beng., A. S. Transact.

Viverrinæ.

VIVERRICULA nob. Size small; habit vermiform; nails more or less raptorial; thumb not wholly elevated. 2 Sp. *Indica et Rape* auct.

Mustelinæ.

URVA nob. 1 Sp. *Urva cancrivora* nob. type. Teeth as in *Herpestes*. Structure and aspect precisely mediate between *Herpestes* and *Gulo*. On

either side the anus a large hollow smooth-lined gland secreting an aqueous fetid humour, which the animal ejects postecally with force. No subsidiary glands nor any unctuous fragrant secretion. Teats 6, remote and ventral. Orbits incomplete. Parietes of the skull tumid, with small cristæ.

Ursina.

URSITAXIS nob. 1 Sp. *inamitus* nob. Indian badger of Pennant and Hardwicke. Molars $\frac{4}{4}$. Aspect and size of *Tarus*; no ears; coarse scant hair; anal glands as in *Mydaus*; genital organ, bony and annulated spirally; typically plantigrade and fossorial, carnivorous.

Bos.

Subgenus? *Bibos* nob. Head and fore-quarters exceedingly large; cranium bovine in its general character, but much more massive and depressed; its breadth between the orbits equal to the height and half of the length; frontals extremely large in all proportions, deeply concave, and surmounted by a huge semi-cylindric crest, rising above the basis of the horns, postcal plane of the skull vertical, equal to the frontal plane, and divided centrally by the lambdoid crest; orbits more salient, and rami of the lower jaw more pointed and straighter, with less elevated condyles than in the *Bos*; 13 pairs of ribs; spinous processes of the dorsal vertebræ extremely developed with gradual diminution backwards, causing the entire back to slope greatly from the withers to the croup; neck sunk between the head and back; dewlap evanescent. horns short, very thick and remote, depressed, subtrigonal, presenting the acute angle of the triangle to the front.

1 spec. new and type. *Bibos carifrons*, nob. Gauri Gau of Hindoos. Hab. Saul Forest. Large wild Indian Bibos, with fine short limbs, short tail, not reaching to the houghs; broad fan-shaped horizontal ears; smooth glossy hair of a brown-red or black colour, paled upon the forehead or limbs; tufted knees and brows, and spreading green horns with round incurved black tips, and with soft rugous bases, furnished postecally with a fragrant secretion; 10 feet long from snout to rump, and $5\frac{1}{2}$ feet high at the shoulder; head (to the crown of the forehead) 24 inches, and tail 33 inches; female rather smaller, but preserving all the characters of the male.

N.B. To all appearance two other species of *Bibos* may be found in the fossil *Urus* of Europe and in Aristotle's wild bull of Persia, with depressed horns. These I would call respectively *Bibos classicus* and *B. Aristotelis*.

Antelopida.

PANTHOLOPS nob. Molars $\frac{5.5}{5.5}$; incisors erect, strong, and rectilinearly ranged; horns with a clear sinus in the cores, long, slender, erect, sublyrate, inserted between the orbits, compressed, nodose, and approximated at their bases; large inguinal purses; no suborbital sinus; nose ovine, bluff, and hairy; large intermaxillary pouches or subsidiary nostrils; knees simple; ears pointed, short; tail short, full; hoofs low, broad and padded;

size, habits and general aspect of *Antilope* and *Gazella*; females hornless, with lesser inguinal purses, and two teats.

1 spec. new and type; *Antilope Hodgsonii* of Abel; the Chiru of Thibet.

Cervidæ.

Genus *Cervus*.

Subgenera: *HARANA* nob. 1 spec. *Cervus Wallichii* Auct. type. Size small; tail nearly obsolete; horns small, branched at the base as in *Cervus*, above as in *Rusa*, and quadrifurcate.

RUCERVUS nob. 1 spec. *Cervus Elaphoides* nob. type. Aspect and size mediate between *Elaphus* and *Hippelaphus*; muzzle remarkably pointed; horns moderate, smooth, pale; one forward basal process on each beam; no median; summit branched as in *Elaphus*; canines in the males only.

RUSA, 2 new spec. *Jaraya* et *Nipalensis*, nob.; canines in both sexes.

GEOLOGICAL SOCIETY.

Extract from the Address of the President, the REV. W. WHEWELL, delivered at the Anniversary on the 16th February, 1838.

“The Council have awarded the Wollaston Medal, as you have already been informed, to Mr. Richard Owen, for his general services to Fossil Zoology, and especially for his labours employed upon the fossil mammalia collected by Mr. Darwin in the Voyage of Captain Fitz Roy. I need not remind you, Gentlemen, how close are the ties which connect the study of living and of fossil animals; how much light the progress of comparative anatomy throws upon the interpretation of geological characters; and what important steps in our knowledge of the past condition of the earth are restorations of the animal forms which peopled its surface in former times, but have long vanished away. Since the immortal Cuvier breathed into our science a new principle of life, the value of such researches has ever been duly appreciated; and the award of the Wollaston Medal last year is an evidence how gladly your Council take that method of congratulating the successful cultivators of such studies. I am sure that all who are acquainted with Mr. Owen’s labours will rejoice that we have in this manner marked our sense of his success. His earlier researches, those for instance on the *Nautilus*, have been of exceeding use and interest to geologists. And the first part of his description of the fossil mammalia, collected by Mr. Darwin in South America, contains matters of the most striking novelty, interest, and importance. We have there the restoration, performed with a consummate skill, such as fitly marks the worthy successor of Hunter and the disciple of Cuvier, of two animals, not only of new genera, but occupying places in the series of animal forms, which are peculiarly instructive.

For the one, the *Toxodon*, connects the Rodentia with the Pachydermata by manifest links, and with the Cetacea by more remote resemblances; and thus contributes to the completion of the zoological scale just in the parts where it is weakest and most imperfect: while the other animal, the *Macrauchenia*, the determination of which is considered by anatomists as an admirable example of the solution of such a problem, appears to be exactly intermediate between the horse and the camel. But this creature is also interesting in another way, since it closely resembles, although on a gigantic scale, an animal still existing in that country and peculiar to it, the Llama. Thus, in this as in some other instances, the types of animal forms which distinguish a certain region on the earth's surface are clearly reflected to our eyes as we gaze into the past ages of the earth's history, while yet they are magnified so as to assume what almost appear supernatural dimensions. The Llama, the Capybara, and the Armadillo of South America are seen in colossal forms in the *Macrauchenia*, the *Toxodon*, and the *Megatherium*. I will not omit this occasion of stating that the profound and enlarged speculations on the diffusion, preservation, and extinction of races of animals to which Mr. Darwin has been led by the remains which he has brought home, give great additional value to the treasures which he has collected, and make it proper to offer our congratulations to him, along with Mr. Owen, on the splendid results to which his expedition has led and is likely to lead. Mr. Owen and Mr. Darwin are engaged in the restoration of other animals from the South American remains in their possession, and I am able to announce that two or three other new genera have already been detected."

BOTANICAL SOCIETY OF LONDON.

March 2.—John Reynolds, Esq., Treasurer, in the Chair.

According to notice, the Curator, Mr. Daniel Cooper, commenced a course of lectures on the practical part of Botany, at 7 p. m. (one hour previous to the chair being taken,) to which the Members and their friends (ladies and gentlemen) were invited. The lecture, being the first of the course, was chiefly introductory. The chair being taken at the usual time, the Society proceeded to ballot for H. B. Fielding, Esq., of Stodday Lodge, near Lancaster, and who was accordingly elected a Member and Local Secretary for the district. Mr. White communicated a paper on a new species of *Epilobium*, which led to some interesting remarks from the Members*. Some beautiful specimens of *Stipa pinnata* were exhi-

* We shall be able to insert this paper entire in our next Number.

bited; and upon the table there were several new kinds of roots, including the new vegetable (*Tropæolum*), &c., presented by Mr. Kernan. After the usual discussion, the Meeting was adjourned until the 16th March.

March 16.—John E. Gray, Esq., F.R.S., President, in the Chair.

The Curator delivered his second lecture on *Roots*, &c. to the Members and their friends. The Society proceeded to ballot for Dr. J. Streiten of Worcester, who was accordingly elected. The Secretary announced that since the last Meeting the Society had received from H. B. Fielding, Esq., of Stodday Lodge, near Lancaster, a valuable donation of plants from all parts of Europe, comprising upwards of a thousand species, some of which were exhibited. A paper was then read from J. Riley, Esq., of Nottingham, in answer to a paper by Mr. White on the *Hybridity of Ferns*, which excited much interest. Mr. D. Cooper exhibited and explained the principles of the *Endosmometer*, after which the Society adjourned until April 6th.

MISCELLANEOUS.

NOTES ON IRISH BIRDS.

KITE. *Milvus iclinus*, Sav.—In the Magazine of Zoology and Botany, vol. ii. p. 171, this bird is mentioned as of doubtful occurrence in Ireland; but from what I have subsequently learned from the very intelligent gamekeeper at Shanes Castle (the seat of Earl O'Neil, on the borders of Lough Neagh), who, from having frequently taken the species in Northamptonshire, is quite conversant with it, and describes it accurately, I have no doubt of its occasional appearance in this country. He states that in cold weather (the season is not remembered), about eight years ago, he saw a kite on two or three occasions hovering over Glenarm Park (county of Antrim), and that in March, 1835, his attention was called to a strange bird, which appeared for three successive days in Shanes Castle park, and which proved to be of this species. In both instances the forked tail served for specific distinction: neither specimen was obtained.

TAWNY OWL. *Uhu stridula*, Selby (vide Mag. Zool. and Bot., vol. ii. p. 179).—By the same person I am assured that an owl of this species was killed within the last few years in Shanes Castle park. Having served in the capacity of game-keeper in England, before coming to this country, he then became acquainted with this bird, which was correctly described to me under the name of Brown

Owl. From his evident knowledge of both species, I have perfect reliance on the accuracy of my informant.

REDSTART. *Sylvia Phanicurus*, Lath.—Since the article was written which appeared in the first number of this work (p. 17), I am enabled to add the following note on this species:—Some years ago in the autumn, a specimen which was shot in the neighbourhood of Belfast, was, when quite recent, obtained by Dr. J. D. Marshall, who informs me that it proved identical with English specimens of *S. Phanicurus* in his collection. It has been unfortunately destroyed by moths.

SPOTTED REDSHANK. *Totanus fuscus*, Leis.—As I did not give any particulars of this bird when it was first recorded as Irish in the Magazine of Natural History, vol. v. p. 578, it may be here mentioned that the specimen alluded to fell by my own gun in Belfast Bay, on August 22, 1823. It was in immature plumage, as admirably represented by Bewick.

NIGHT HERON. *Nycticorax Europæus*, Steph.—In the Proceedings of the Zoological Society of London for 1834 (p. 30), I noticed a specimen of this bird, which was stated to have been sent from Letterkeuny to Dublin, and received there in a recent state at the beginning of that year. Subsequently, one of these birds, in the plumage of the first year, or that of the Gardenian Heron, was shot in the county of Armagh, and presented to the Belfast Museum.

FORK-TAILED GULL. *Larus Sabinii*, Sab.—I have to record the occurrence of a fourth individual of this species in Ireland. It was shot in company with Terns (*Sterna*) in the bay of Dublin, on September 12, 1837, and came into the possession of H. H. Donbrain, Esq., of that city. This gentleman has kindly informed me that the specimen corresponds with the description of the *L. Sabinii* in the plumage of the first year (Mag. Zool. and Bot., vol. i. p. 460) in every respect but one, that of having "the under part of the throat and the upper part of the breast" white, instead of "pale ash colour," as in the bird originally described. Having just seen the notes of the late Mr. Montgomery on the first of these gulls obtained in Ireland, I am enabled to add the colour of the bill, legs, &c., which in the immature bird has not been described. Under the name of "*Larus minutus*", which it was considered to be, it is remarked of this individual, "irides dark, bill black, legs pale flesh colour, weight $5\frac{1}{2}$ ounces." The dates of the occurrence of the *L. Sabinii* in Ireland approximate very closely, though they were all obtained in different years. In Belfast Bay they were shot on the 15th and 18th of September, and in Dublin Bay on the 12th of the

same month. The date when the first specimen was procured here is unknown.

The Woodcock (*Scolopax rusticola*) breeding in Ireland.—Within the last few years these birds have bred in several of the Irish counties, including northern, central, and southern. The details on this subject, as well as on the spotted redshank and night heron, are reserved for their due place in my intended series of papers on the Birds of Ireland, of which three have already appeared in the second volume of the Magazine of Zoology and Botany, and one in the first number of this work.—W. THOMPSON, *Belfast, March 1838.*

FOSSIL SALAMANDER AND COPROLITE.

In a Letter from M. de Paravey to the French Academy, the writer states that he saw at Leyden, in the cabinet of M. van Breda, the fossil skeleton of a salamander, about three feet long, and in a more perfect state than that figured by Scheuchzer in his *Homo diluvii testis*. What increases the value of this specimen is that it contains in the part corresponding to the abdomen several coprolites, in which we detect fragments of the bones of frogs and of eels, &c., so that we have proof that the antediluvian species had the same kind of food as the larger salamanders of the present day. A very large salamander, brought by M. Siebold from Japan, is still living at the Leyden Museum, and is fed chiefly with frogs. This celebrated traveller brought to Europe the male and female, but the latter was one day devoured by its companion, which no doubt had been kept too long without food.—*Comptes Rendus*, Nov. 19, 1838.

HABITS OF THE BLUE TITMOUSE (*Parus caeruleus*).

A redstart (*Phaenicura ruticilla*), and a blue titmouse built nests in an old wall within a few feet of my parlour window. The nests were placed within three feet of each other; that of the redstart in a very open rent, while that of the titmouse was better secured by having a very small entrance, as is usually the case with the situations chosen by this bird. My attention was at first attracted by the violence with which I frequently saw the titmouse drive away both the parent redstarts when approaching their own nest with food for their young; and, knowing the pugnacious disposition of the titmouse, I at first thought that it wished to destroy its neighbours, as after chasing them to a little distance it would fly into the redstart's nest. As the redstart was to me the rarest bird, I began to debate with myself whether I should not destroy the titmouse, that the other might not be prevented from bringing up its young. In the

course of doing so, and observing the attacks I have described frequently repeated, I was at last astonished to find that the object of the titmouse was actually to feed the young redstarts together with its own. I spent many an hour in watching this, and have seen that when both parents arrived at the same time with caterpillars in their bills, the titmouse would fiercely drive the redstart away and give the caterpillar to its young. In this way did the titmouse indiscriminately feed the young in both nests, while the redstart never attempted such a reciprocation of favour; but when arriving with food for its own young, would wait on a neighbouring branch till the old titmice left their nest.—M. HILL, *Rowmore*.

ZOOLOGICAL GARDEN IN EDINBURGH.

For several years there has been an endeavour to establish a Zoological Garden in Edinburgh. Mr. Wombwell made offers at one time, and Sir Thomas Dick Landor has often used his interest for the same purpose. The great want has hitherto been the difficulty of getting some active person as a general superintendent; and Mr. Douglas, who has for several years imported for sale a considerable selection of foreign birds, has expressed his willingness to undertake the charge, and to embark a portion of his own capital in the undertaking. Several influential gentlemen in Edinburgh and its vicinity have been spoken with, and have expressed their anxiety to support the Garden. A piece of ground at the west end of the town, on the property of Coates, has been examined, and could it be obtained would be a most suitable site, being free from damp, and at the same time affording facilities for artificial waters. When the plans are more matured we shall report progress, and in the mean time will hope that the Societies already prosperous will contribute to the advancement of one about to be commenced.

TWEEDSIDE PHYSICAL AND ANTIQUARIAN SOCIETY.

This Society, only established in 1834, has advanced most rapidly. Its collections have increased so greatly that more accommodation is now required; and at a late meeting it has been resolved to build a museum in Kelso. For this purpose the gentlemen in the vicinity have subscribed liberally; while the society of gentlemen educated at Kelso Grammar School have given the sum of 200*l.* to aid in its erection. We are induced to make this short notice to show the advance which Natural Science is making north of the Border; and as the first instance, we believe, where a provincial Society in Scotland has ventured to erect a Museum, for the purpose alone of accommodation for its meetings and the preservation of its collections.

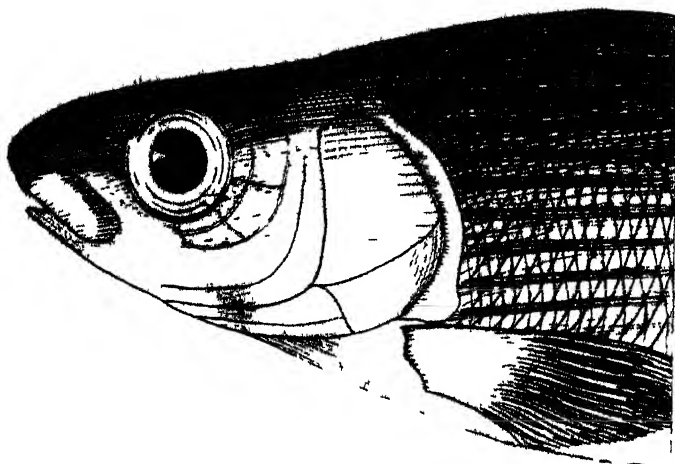
Abstract of Meteorological Observations for 1837, made at Applegarth Manse, Dumfriesshire. Longitude, 3° 12' W.; latitude, 55° 13' N.; height above the Sea, 180 feet; distance from the Sea, 10 miles; times of observation 9 A.M. and 9 P.M.

Barometer.

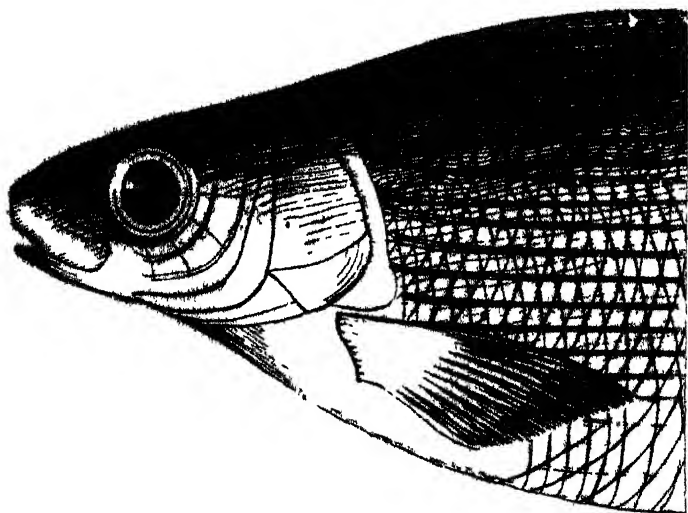
| 1837. Months. | Mean Atmospher- ical Pressure at 9 a.m. | Mean Atmospher- ical Pressure at 9 p.m. | Mean of both. | Mean range in the day. | Mean range in the night. | Mean range in 24 hours. | Monthly Extremes. | | |
|------------------|-----------------------------------------------|-----------------------------------------------|---------------|---------------------------|-----------------------------|----------------------------|-------------------|---------|--------------------------------|
| | | | | | | | Highest. | Lowest. | Greatest range in 24 hours. |
| May | 29.79 | 29.80 | 29.795 | .034 | .057 | .141 | 30.260 | 29.175 | .486 |
| June | 30.47 | 29.82 | 30.145 | .088 | .075 | .163 | 30.225 | 29.172 | .520 |
| July | 29.79 | 29.78 | 29.785 | .077 | .052 | .129 | 30.230 | 28.960 | .434 |
| August | 29.82 | 29.83 | 29.825 | .090 | .076 | .166 | 30.264 | 29.262 | .462 |
| September | 29.74 | 29.73 | 29.735 | .073 | .063 | .136 | 30.306 | 29.137 | .256 |
| October | 29.81 | 29.81 | 29.81 | .115 | .084 | .199 | 30.504 | 28.783 | .375 |
| November | 29.54 | 29.57 | 29.555 | .117 | .132 | .249 | 30.144 | 28.705 | .580 |
| December | 29.87 | 29.67 | 29.770 | .142 | .084 | .226 | 30.340 | 28.982 | .620 |
| Average... | 29.85 | 29.75 | 29.800 | .098 | .077 | .176 | | | |

Thermometer.

| Months. | Mean Tempera- ture at 9 a.m. | Mean Tempera- ture at 9 p.m. | Mean of both. | Highest. | Lowest | Monthly range. | Rain : | | |
|-----------------|---------------------------------|---------------------------------|---------------|----------|--------|-------------------|------------------------------------------------------------|-----------------------------------------|------|
| | | | | | | | Relative proportions in Summer and Winter. | | |
| January | 32.0 | 33.0 | 32.5 | 44.5 | 18 | 26.5 | From 1st of April to 1st of October. | From 1st of October to 1st of April. | |
| February | 44.7 | 36.3 | 40.5 | 45.5 | 25 | 20.5 | | | |
| March | 33.3 | 30.7 | 32.0 | 42 | 24 | 18 | | | |
| April | 39.4 | 35.0 | 37.2 | 49 | 23 | 21 | April | October | 3.34 |
| May | 49.6 | 45.0 | 47.3 | 57 | 36 | 21 | May | November | 3.68 |
| June | 57.6 | 52.5 | 55.1 | 67 | 44 | 23 | June | December | 4.34 |
| July | 61.0 | 56.6 | 58.8 | 69 | 52 | 17 | July | January | 2.42 |
| August | 57.0 | 53.0 | 55.0 | 65 | 44 | 21 | August | February | 1.08 |
| September | 51.2 | 50.1 | 50.7 | 62 | 43 | 19 | September | March | 3.50 |
| October | 47.5 | 45.0 | 46.2 | 57 | 33 | 24 | | | |
| November | 38.3 | 35.5 | 35.9 | 49 | 23 | 26 | | | |
| December | 37.0 | 37.8 | 37.4 | 46 | 28 | 18 | | | |
| Average... | 45.5 | 42.5 | 44.0 | | | 21.25 | Total 35.21 inches. Rain Gauge 10 feet from the ground. | | |



Surge wrasse *Surge wrasse* *Surge wrasse*



Surge wrasse *Surge wrasse* *Surge wrasse*

ANNALS OF NATURAL HISTORY.

XVI.—*Observations on the Coregoni of Loch-Lomond.* By
RICHARD PARNELL, M.D., F.R.S.E.

(With a Plate.)

IN Loch-Lomond, one of the largest and most picturesque lakes in the west of Scotland, are found two species of *Coregonus*, one of which I believe to be an undescribed British species, and the other, which was first noticed by Lacépède under the name of "*Coregone Clupeoide*," has been confounded by British naturalists with the *Coregonus Lavaretus* or Ulswater Gwiniad. Pennant, in his third volume of British Zoology, considers the *Coregonus* of Loch-Lomond to be the same as the Vendace of Lochmaben, the Gwiniad of Ulswater, and the Pollan of Loch Neagh in Ireland. Dr. Fleming in his work on British Animals entertains the same opinion. Sir William Jardine, Bart. in the third volume of the Edinburgh Journal of Natural and Geographical Science has given an interesting account of the Vendace of Lochmaben, and has clearly shown it to be a distinct species from the other British *Coregoni*. Mr. Thompson of Belfast has satisfactorily proved the Pollan of Loch-Neagh to be also a distinct species, and has minutely pointed out the characters in the first volume of the Zoological and Botanical Magazine; nor should I be surprised still to find additional species were attention directed to the Gwiniads of Cumberland, since the whole of the *Coregoni* are so closely allied. From Lacépède's short and imperfect description of the *Coregone Clupeoide*, and as two species are found inhabiting the same locality, it is impossible to state with certainty to which he alludes; therefore to prevent the confusion which otherwise might arise from synonyms, I propose for the one species the name of *Coregonus Lacepedei*, and for the other *Coregonus microcephalus*.

Ann. Nat. Hist. Vol. 1. No. 3. May 1838. M

THE LONG-NOSED POWAN, *Coregonus Lacepedei*, Parnell.

DESCRIPTION: from a specimen of fourteen inches in length. Head long and narrow, of an oval form, about one fifth the length of the whole fish, caudal fin included; depth of the body between the dorsal and ventral fins less than the length of the head. Colour of the back and sides dusky blue, with the margin of each scale well defined by a number of minute dark specks; belly dirty white; the lower portion of the dorsal, caudal, pectoral, ventral, and anal fins dark bluish grey; irides silvery; pupils blue. First ray of the dorsal fin commencing half-way between the point of the snout and the base of the short lateral caudal rays; the first ray simple*, the rest branched; the second and third the longest, equalling the length of the pectorals; the seventh as long as the base of the fin; the last one third the length of the fourth; adipose fin large and thin, situate midway between the base of the fourth dorsal ray and the tip of the long ray of the caudal fin; anal fin commencing half-way between the origin of the ventrals and the base of the middle caudal ray; the first ray simple, the rest branched; the second rather the longest; the third as long as the base of the fin; the last half the length of the fifth; ventrals commencing under the middle of the dorsal; the third ray the longest, equalling the length of the same ray of the dorsal; pectorals long and pointed, one sixth the length of the whole fish, caudal fin included; the first ray simple; the second and third the longest, the last short, not one fourth the length of the first; tail deeply forked, with the upper portion of the long rays curving slightly inwards, giving the fin a peculiar form. Gill-cover produced behind; the basal line of union between the operculum and sub-operculum oblique; the free margin of the latter slightly rounded; pre-operculum angular; snout prominent, somewhat of a conical form, extending beyond the upper lip; jaws of unequal length, the lower one the shortest. The maxillary bone broad, the free extremity extending back to beneath the anterior margin of the orbit. Teeth in the upper jaw long and slender, about

* The first three short simple rays of the dorsal fin, and the short lateral rays of the caudal, are not here taken into consideration, as when recent they are liable, from their size, to be overlooked.

six in number ; those on the tongue shorter and more numerous. Eyes large, extending below the middle of the cheeks ; lateral line commencing at the upper part of the operculum, and running down the middle of the sides to the base of the middle caudal ray. Scales large and deciduous, eighty-four in the lateral line, eight between the dorsal fin and lateral line, and the same number between the lateral line and the base of the ventrals. Number of fin rays,

D. 12 ; P. 16 ; V. 12 ; A. 11 ; C. 20. Cæca 120.

This fish occasionally grows the length of sixteen inches, and is distinguished by the great length of the head compared to that of the body ; the snout extending beyond the upper lip ; the under jaw the shortest ; the length of the pectoral and dorsal fins ; the large scales ; the number of rays in the anal fin, the peculiar shape of the caudal, and the position of the dorsal fins. It agrees in figure with the *Salmo Wartmanni* of Bloch, but not in description. In the stomach of one of the specimens I examined were found several species of entomostrea, larva of insects, a few coleoptera, a number of small tough red worms little more than half an inch in length, and about the thickness of a coarse thread, besides a quantity of gravel which the fish had probably accumulated when in search of the larva.

THE SHORT-HEADED POWAN, *Coregonus microcephalus*, Parn.

DESCRIPTION : from a specimen thirteen inches in length. Head short, of a triangular form, one sixth the length of the whole fish, caudal fin included ; depth of the body between the dorsal and ventral fins considerably more than the length of the head. Colour of the back and sides dusky blue, with the margin of each scale well defined by a number of minute dark specks ; belly dirty white ; the lower portion of the dorsal, caudal, pectoral, ventral, and anal fins dark bluish grey ; irides silvery ; pupils blue. First ray of the dorsal fin commencing half-way between the point of the snout and the adipose fin ; the first ray simple, the rest branched, the second and third the longest, more than equalling the length of the pectorals ; the sixth as long as the base of the fin, the last one third the length of the fourth ; adipose fin large and thin, situated midway be-

tween the base of the eighth dorsal ray and tip of the long ray of the caudal fin ; anal fin commencing half-way between the origin of the ventrals and the base of the middle caudal ray ; the first ray simple, the rest branched ; the second rather the longest ; the third as long as the base of the fin ; the last half the length of the fifth ; ventrals commencing under the middle of the dorsal, the second ray the longest, equalling the length of the fourth ray of the dorsal ; pectorals short and pointed, one seventh the length of the whole fish, caudal fin included ; the first ray simple, the second and third the longest ; the last short, about one third the length of the first ; tail deeply forked with the long rays curving slightly inwards. Gill cover very slightly produced behind ; the basal line of union between the operculum and sub-operculum very oblique, the free margin of the latter rounded ; pre-operculum angular. Snout truncated, not projecting beyond the upper lip ; under jaw rather the shortest ; maxillary broad, extending back to beneath the anterior margin of the orbit. Teeth in the upper jaw long and slender, about six in number ; those on the tongue shorter and more numerous. Eyes large, reaching below the middle of the cheeks ; lateral line commencing at the upper part of the operculum, and running down the middle to the base of the centre caudal ray. Scales large and deciduous, eighty-four in the lateral line, eight between the dorsal fin and lateral line, and the same number between the lateral line and the base of the ventral. Number of fin rays,

D. 12 ; P. 16 ; V. 12 ; A. 11 ; C. 20. Cæca 116.

Stomach filled with entomostracous animals, presenting in the mass a granular appearance, and a reddish brown colour.

This fish differs from *C. Lacepedei* in the shortness of the head and pectoral fins, and in the snout not projecting beyond the upper lip, as well as in other respects, as will be best seen by comparing the descriptions and accompanying figures. It is at once removed from *C. Willoughbigii* of Jardine, the Lochmaben Coregonus, and *C. Pollan* of Thompson from Loch Neagh, by the under jaw being the shortest. On comparing it with *C. Lavaretus* of Jenyns, it is much deeper fish ; the head and pectorals are much shorter, the upper jaw rather the

longest, and furnished with distinct teeth; anal fin with fewer rays: it besides grows to a larger size. The descriptions of continental authors are not sufficiently minute to identify this species.

These fish are found in Loch-Lomond in great numbers, where they are named *Powans* or *Freshwater Herrings*. They are caught from the month of March until September with large drag nets, and occasional instances have occurred in which a few have been taken with a small artificial fly; a minnow or bait they have never been known to touch. Early in the morning and late in the evening large shoals of them are observed approaching the shores in search of food, and rippling the surface of the water with their fins as they proceed. In this respect they resemble in their habits those of the Loch-maben Vendace and the common saltwater herring. They are never seen under any circumstances during the middle of the day. From the estimation these fish are held in by the neighbouring inhabitants, they are seldom sent far before they meet with a ready sale, and are entirely unknown in the markets of Glasgow. In the months of August and September they are in best condition for the table, when they are considered well-flavoured, wholesome, and delicate food. They shed their spawn in October and December, and remain out of condition until March*.

XVII.—*An account of a Journey to, and a Residence of nearly Six Months in, the Organ Mountains, with Remarks on their Vegetation.* By MR. GEORGE GARDNER.

(Communicated by the Author to Sir W. J. Hooker.)

HAVING packed up all the collections which I made in the neighbourhood of Rio de Janeiro, and left them in the city to be forwarded in the first ship for London, I started on the morning of the 25th of December for the Organ Mountains. The peaks which receive this appellation are part of a mountain range stretching from beyond Bahia in the north to Bue-

* Communicated to the Royal Society of Edinburgh, when specimens of all the *British Coregoni* were at the same time exhibited.

nos Ayres in the south. The name which the Portuguese have bestowed on them (*Serra dos Orgãos*) originated from a fancied resemblance which the peaks, which rise gradually the one above the other, bear to the pipes of an organ. Having learned that two or three English merchants, whose families had gone up to the mountains for the summer months, were about to start to spend the Christmas holidays with them, it was with much pleasure I accepted an invitation to accompany them in their boat. One of them was George March, Esq., the gentleman at whose "Fazenda" I was to live while remaining on the mountains.

It was midday before we could leave the city, and under the influence of a strong sea breeze we reached Piedade, the landing place, at half-past three, the distance from the city being about twenty miles. The day was a most delightful one, in consequence of which, and of the many verdant little islands among which we were constantly gliding, the passage was so pleasant that I almost regretted its shortness. At Piedade, mules from Mr. March's fazenda were waiting for us and our luggage; and after a short stay for the arrangement of the latter we commenced our land journey. The road from Piedade to Magé, a village about four miles distant, leads through a flat, sandy, and in several places marshy plain, covered with low trees and bushes, principally *Melastomaceæ*, *Malvaceæ*, and *Myrtaceæ*, and great abundance of *Selinum terebinthifolium* (Raddi). In the hedges, by the road side, I saw several species of *Cissus*, *Bignonia*, and *Paullinia*, and in moist places many plants of *Dichorizandra thyrsiflora* in beautiful flower. The sandy fields were covered with a large species of *Cactus*, among which many plants of *Fourcroya gigantea* (Vent.) were to be seen throwing up their flowering stems to a height of twenty and thirty feet. From Magé to Freschall, a distance of fourteen miles, the road is still flat, but winds round many low hills, the sides of which are covered with *Mandiocca* plantations. We arrived at Freschall at half-past seven o'clock p.m., and remained there for the night.

Next morning by break of day we again continued our journey. At about two miles from Freschall the ascent of the mountains begins. From thence the distance to Mr. March's

fazenda, which stands at an elevation of three thousand one hundred feet above the level of the sea, is twelve miles. During the whole way the road is very bad, and in many places so steep that it is with considerable difficulty the mules make their way up it. Indeed to one unused to travel on such roads, which have more the appearance of the bed of a mountain torrent than a pathway for beasts of burden, many parts of it appear impassable; but he is soon undeceived by the slow yet sure manner in which the mules pass over the worst portions of it, especially if left entirely to themselves. During the whole ascent the road passes through a dense forest. The magnificence of these forests cannot be imagined by one who has not seen them and penetrated into their recesses. Those remnants of the virgin forest which still remain in the vicinity of the capital, although they appear grand to the eye of the newly-arrived European, become insignificant when compared with the mass of giant vegetation that clothes the sides of the Organ Mountains. Many of the trees are of immense size, their trunks and branches covered with myriads of parasites, consisting of *Orchideæ*, *Bromeliaceæ*, Ferns, *Peperomiæ*, &c. I have since ascertained that a great proportion of the largest of these trees are species of *Ficus*, *Myrtus*, *Laurus*, *Melastomaceæ*, and *Leguminosæ*. Some of them have their trunks encircled by twiners, the stems of which are often thicker than what they surround. This is particularly the case with a species of *Ficus*, called by the Brazilians *Cipo Matador*. It runs straight up the tree to which it has attached itself, but at the distance of about every ten feet it throws out from each side a thick clasper, which curves round, and closely entwines the other stem. As both the trees increase in size, the pressure ultimately becomes so great, that the supporting one dies from the embrace of the parasite.

At the base of the mountains the underwood principally consists of shrubs belonging to the natural orders *Melastomaceæ*, *Myrtaceæ*, *Compositæ*, and *Rubiaceæ*, among which are many large species of herbaceous ferns and several palms. About the middle palms and tree-ferns abound, some of the latter reaching to a height of not less than thirty feet. At an

elevation of about 2000 feet a large species of bamboo (*Bambusa Tagoara*, Mart.) makes its appearance. The stems of that gigantic grass are often eighteen inches in circumference, and attain a height of from fifty to sixty feet. They however do not grow perfectly upright, but are much bent, the tops of them sometimes nearly reaching to the ground. By the road side I saw many herbaceous plants in flower, which I had not then an opportunity of collecting.

We reached Mr. March's fazenda early in the forenoon. It being Christmas-day, we found his slaves, who amount to 100 in all, performing a native dance in the yard before the house. His estate embraces an extent of country containing sixty-four square miles. The greater part of it is still covered by virgin forests; what is cleared of it consists of pasture land, and several small farms for the cultivation of Indian corn, *fiagreus* (French beans), and potatoes. Plentiful crops are yielded by the two former, but the produce of the latter is neither so abundant nor so good as it is in England. He has also near to his house a large garden, under the management of a French gardener, in which all the European fruits and vegetables grow tolerably well. Many of these he has been at much trouble and expense in introducing from the Old World. From this garden he sends regular supplies of vegetables to the Rio market, and they are by far the best that are to be found in it. The most fertile part of the estate is situated between the higher chain of the Organ Mountains and a range of smaller mountains nearly parallel with it. Through this valley there runs a small river, about the size of the Kelvin at Glasgow, which is fed by several small streams from the mountains.

At this elevation the seasons are much better marked than they are at Rio. On my arrival I found that summer was just setting in, and consequently I was just in time to secure the first flowers of the season. Two months earlier I was told that I should have met with but few plants in flower. As my excursions extended in all directions, to a distance of from ten to twenty miles from Mr. March's house, my collections will give a tolerably accurate knowledge of the vegetable produc-

tions of this part of the country. In the following short sketch I shall merely mention what are the most common plants, which are peculiar to a few well-marked situations.

1st. *Marshes*.—The shrubby vegetation of marshes consists chiefly of *Melastomaceæ*, some of which are beautiful large-flowered species of *Lasiandra*, which rival the *Rhododendrons* in the richness of their colours. Among these are also to be seen a few species of *Myrtaceæ*, and several fruticose and sub-fruticose species of *Vernonia*. The herbaceous plants consist of *Compositæ*, the most common one of which is a large white-flowered species; several *Utriculariæ*; a *Drosera*; different species of ferns, one of them a fine *Osmunda*; many species of *Begonia*, *Cyperaceæ*, *Gramineæ*, and terrestrial *Orchideæ*.

2nd. *Pastures*.—The turf of these consists of different species of *Gramineæ*, principally of the genus *Chloris*, but it is with labour that pastures can be kept from running into a mass of shrubs and underwood, from the rapidity with which plants of these characters usurp the soil. Hence all the pastures which exist on the Organ Mountains are artificial, not natural. The shrubs which spring up most commonly are various species of *Melastomaceæ*, *Myrtaceæ*, *Croton*, *Rubiaceæ*, *Leguminosæ*, *Solanum*, *Myrsinæ*, *Samydeæ*, *Vismia Brasiliensis*, *Lantana*, *Malvaceæ*, &c. The suffruticose and herbaceous plants which are met with in greatest abundance in pasture lands, consist of numerous kinds of *Compositæ*, embracing species of *Vernonia*, *Eupatorium*, *Baccharis*, &c.; a few of *Hyptis*, *Rubiaceæ* and ferns. Of the latter, *Pteris caudata* is by far the most troublesome.

3rd. *Cultivated lands*.—The plants of these places are a species of *Phytolacca*, *Sonchus oleraceus*, *Tagetes minuta*, *Capsicum*, *Ageratum conyzoides*; a repent species of *Polygonum*, *Chenopodeæ*, *Richardsonia scabra*, and *Stellaria media*.

4th. *Bushy places*. (Capœra).—The plants belonging to this division are what have sprung up in land which many years had been under cultivation. They consist principally of small trees and shrubs, of various sizes, and are always very different from what constituted its original vegetation. Here may be observed several species of *Lasiandra* and other shrubs belonging to the natural order *Melastomaceæ*; an arboreous

Vernonia, and various species of *Inga*, *Cassia*, *Solanum*, *Croton*, *Myrsineæ*, *Ægiphila*, *Myrtaceæ* and *Lantana*, *Cerasus sphærocarpa*, *Clethra fagifolia*? *Cestrum* of different species, and, principally by the sides of rivers, *Datura arborea*; among these grow many herbaceous plants and climbing species of *Compositæ* and *Leguminosæ*. Among the shrubs of this division I met with a species of *Ilex*, perhaps *Ilex paraguayensis*, the leaves of which are used by the blacks as a substitute for tea. I did not see it in flower, and could only meet with two specimens, having a single fruit on each. In habit it is a very upright growing shrub, about fifteen feet high; where the ground is rather swampy a fine species of *Talauma* prevails. It forms a tree from fifteen to thirty feet high, and its large green leaves and large pale yellow flowers render it one of the most striking trees I have ever met with. The flowers are highly odoriferous, and a single tree can be discovered by the sense of smell alone at a distance of more than half a mile when the wind blows in the direction from it. In swampy situations one or two species of *Laurus* are also found.

5th. *Virgin Forests*. 1st. *Trees*.—So far as I have been able to ascertain, these consist for the most part of numerous species of *Palmeæ*, *Laurus*, *Ficus*, *Cassia*, *Bignonia*, and *Solanum*. *Chorisia speciosa* (St. Hilaire), and many myrtaceous trees also abound in the dense forest, among which I found three species of *Campomanesia*, two of them in fruit, but from the other I obtained good specimens. I likewise observed several trees of a large size belonging to the natural order *Proteaceæ*. Specimens from one of them will be found in the collection of dried plants from the Organ Mountains, marked No. 615. The various species of *Laurus* form fine large trees, and when growing, as they often do, in an open part of the forest, they remind the European of the oaks of his native country. They flower in the months of April and May, at which season the atmosphere is loaded with the rich perfume of their small white blossoms. When their fruit is ripe, it forms the principal food of the Jacutinga, (*Penelope Jacutinga*, Spix,) a fine large game bird. Some of the largest trees of the forest are species of *Ficus*; one, with an enormous height and thickness of stem, is called by English here the *buttress*

tree, from several large thin plates which stand out from the bottom of the trunk. They begin to jut out from the stem at the height of ten or twelve feet from the bottom, and gradually increase in breadth till they reach the ground, where they are connected with the large roots of the tree. At the surface of the ground these plates are often five feet broad, and throughout not more than two inches thick. The large *Cassia* have a striking appearance when in flower; and as an almost equal number of large trees of *Lasiandra Fontanesiana* and other species belonging to the same natural order are in bloom at the same time, the forests are then almost one mass of yellow and purple from the abundance of these flowers. Rising amid these the pink-coloured flowers of the *Chorisia speciosa* can be easily distinguished. This is a large tree, with a stem, covered with strong prickles, from five to six feet in circumference, unbranched to the height of twenty or thirty feet. The branches then form a nearly hemispherical top, which, when covered with its thousands of beautiful large pink-coloured blossoms, has a striking effect when contrasted with the masses of green, yellow, and purple of the surrounding trees. Many of these large trunks afford support to various species of climbing and twining shrubs belonging to the natural orders *Bignoniaceæ*, *Compositæ*, *Apocynææ*, and *Leyuminosæ*. The stems of these climbers frequently assume a very remarkable appearance. Several of them are often twisted together and dangle from the branches of the large trees like ropes, while others are flat and compressed like belts: of the latter description I have met with some six inches broad, and not more than a quarter of an inch thick. Two of the finest of these climbers are the beautiful large-flowered *Solandra grandiflora*, which diffusing itself among the branches of the largest trees of the forest gives them a magnificence not their own; and a showy species of *Fuchsia*, which is very common, attaching itself to all kinds of trees, and often reaching to a height of forty and fifty feet.

2nd. *Shrubs*.—The shrubs which are found in the virgin forests principally consist of numerous species of *Rubiaceæ*, *Myrtaceæ*, *Melastomaceæ*, and Palms; *Franciscea ramosissima*, (Pohl), and another species allied to Pohl's *F. hydrangeæ-*

formis, *Cybianthus cuneifolius*, (Mart.) which is very abundant, and several fruticose *Compositæ*.

3rd. *Herbaceous Plants*.—These are often very numerous, particularly in moist shady situations. They consist of great profusion of ferns, suffruticose and herbaceous species of *Begonia*, some of them with very large foliage, and rising to the height of twelve and fifteen feet. In dry rocky places *Bromeliaceæ*, *Orchideæ*, and *Dorsteniæ* prevail, mixed with suffruticose and tuberous-rooted species of *Gesneriaceæ*.

Having thus given a general view of the vegetation of the Organ Mountains at an elevation of three thousand feet above the level of the sea, I shall now offer an account of two journeys which I made to the high peaks of that range. The estimated altitude of the loftiest point is six thousand feet, and consequently is three thousand feet above Mr. March's house, which is the highest on the range. The only botanists who have visited his estate are Langsdorff, Burchell, and a German of the name of Lhotsky. The former explored the vegetation in the neighbourhood of the fazenda during a few weeks, about twelve or thirteen years ago; Mr. Burchell remained six weeks, nine or ten years since; and Lhotsky two or three weeks only, five years ago. None of them botanized higher than the level of Mr. March's house, and the knowledge of this fact made me the more anxious to spend a few days among the high peaks for the purpose of making collections of their vegetable productions. I had fixed on the early part of April for going up, but the whole of that month was so wet that I was prevented at that time from putting my design into execution. May however having set in fine, I set off on the morning of the 6th accompanied by four negroes. One of them, a Creole upwards of sixty years of age, was to act as guide. This old fellow is one of the most active, not only of blacks, but of any individual of his years I have ever seen. From his infancy he had been used to the woods, and is one of the best hunters on the estate. The other three were engaged to carry provisions and to assist in taking home my collections. We entered the forest at about a mile to the north of Mr. March's house, and our route for that day was

nearly due west. Two years ago an English merchant for mere curiosity ascended to within a few hundred feet of the summit of the highest peak, guided by the same old black who accompanied me. For the first few miles we were able to keep on the path which he had made, but from the rapid growth of the bamboos and underwood through which it had been cut, it was as difficult to force our way through it as if no path had ever been made. Our progress was but slow, one of the blacks requiring to go before in order to cut a way. Some of the bamboos are of immense size; I measured several more than four inches in diameter, and their height could not be less than sixty or seventy feet. The internodes are always half filled with water, obviously secreted by the plant itself. Prince Maximilian in his travels speaks of this fluid as forming a most refreshing beverage to hunters and others in the woods. I have frequently tasted it, but always found it so nauseous that the most urgent thirst alone would compel me to drink it.

Near the entrance of the wood we passed a large species of *Copaifera*, the lower part of the stem of which had been pierced for the purpose of obtaining the balsam which exudes from it. For several miles our route lay nearly parallel with a small river, along the banks of which grew some very large trees, among which I observed a large species of *Laurus* and another of *Lasiandra*, both in flower. The underwood consisted of great variety of shrubby *Melastomaceæ*, *Myrtaceæ*, *Rubiaceæ*, and suffruticose species of *Begonia*. Beautiful ferns and handsome flowered *Begonia* were trod down at every footstep. The stems of the large trees were covered with *Bromeliæ*, *Tillandsiæ*, *Orchideæ*, ferns, and climbing species of *Begonia*. Occasionally a large plant of *Cereus* (*Cactus*) *truncatus* was to be seen hanging from the stem of some large tree covered with hundreds of beautiful pink blossoms. Among the shrubs I found *Cybianthus cuneifolius* (Mart.), and collected specimens both in flower and in fruit. The latter not having been found by Martius I have been enabled to note its structure, respecting which the only fact worthy of being noticed in this place is the circumstance of its embryo having four cotyledons: as none of the species of the order are men-

tioned either by Decandolle or Lindley to be possessed of this conformation, it seems to be an anomaly. The plant grows in shady places of the forest, and reaches to a height of from four to six feet, with the leaves growing for the most part at the ends of the long slender branches. In crossing over a hill about five hundred feet high, the low trees on the top of it were literally covered with various species of *Orchideæ*, but I found nothing among them that I had not previously met with. Several large plants of *Oncidium divaricatum* were in flower, as were also a small *Maxillaria* and some small *Epidendra*. On this hill I observed two species of *Bambusæ* different from the large kinds in the woods below. One of them had the internodes considerably shorter in proportion to the size of the plant, and was altogether much smaller. The other species was still less, its stem not being more than a quarter of an inch in diameter, but continuing of that thickness to a height of fifteen or twenty feet. The getting through these was the most difficult part of our day's journey. At 4 p.m. we reached a place by the side of a small stream, where I determined to remain for the night; and while the blacks were occupied in cutting wood for a fire and in preparing some food, I went up the course of the little stream in search of plants; as I estimated this spot to be about 1500 feet high, and naturally expected a different vegetation from what there was in the plain below. The first plant that attracted my attention was what I then imagined to be a fine individual of *Cereus truncatus* in full flower hanging from the under side of the trunk of a large tree that was bent over the stream. As I wanted to add a few specimens of it to my collection I soon managed to put myself in possession of the whole plant, when to my surprise and delight I found it to be a new species. I felt glad that I had taken the plant down and not passed it by as I had once intended. In habit it is quite like *C. truncatus*, but when the flowers are examined it proves abundantly distinct, in its four winged ovary, its straight and regular, not oblique and irregular, flower, the deeper and more delicate hue of the inflorescence, and the pink not white colour of its filaments. I have named it *Cereus Russellianus* in honour of His Grace the Duke of Bedford. A

little way further up, by the side of a small water-fall, and on a moist slanting bank near it, I found great quantities of a fine dark red-flowered *Amaryllis*, of which I collected specimens and took up a good many of the roots. It is perhaps undescribed, as I can find nothing to agree with it in my books, but this may soon be ascertained as I have sent home specimens and a great many bulbs. The place where it grows is one of the most charming I have ever seen. The bed of the stream is about ten feet broad, but it is only during heavy rains that it covers this space. At this time the stream was little more than perceptible. The water falls over three successive shelves of granite, each about eight feet high; along the stream at the bottom of the fall there are several middle-sized trees, the branches of which are festooned with the long branches of the same *Fuchsia* as grows abundantly below, loaded with splendid crimson flowers. By the side of the fall are several bushes of a large flowered species of *Lasiandra*, and along with them a few of a red-blossomed *Virgularia*, and a broad thick-leaved species of *Clusia*, loading the atmosphere with a delightful odour arising from its large white inflorescence. Beneath these grows the *Amaryllis* already mentioned, an *Eryngium*, and several *Bromeliaceæ*. On the face of the rocks I saw several mosses, but none of them in fruit. Having gained the upper part of the fall I found a space extending to a considerable distance on each side and for some way up the mountain, destitute of trees;—nothing but bare portions of rock with occasional masses of low shrubs and herbaceous plants. Among these, the beautiful *Zygopetalon Mackaii*, and the odoriferous *Maxillaria picta*, were not the least common. Darkness now beginning to set in, I returned to the encampment, and found a large fire lighted and something prepared to eat. After dinner I put the plants which I had collected during the day into paper. The evening was so fine that I considered the erection of a hut unnecessary, and lay down about 8 p.m. on a few palm leaves by the fire, with my poncho wrapped round me, to pass the night.

When I arose next morning at day break I found the thermometer at 46°. While breakfast was preparing I again went out to botanize, but added little more than a few ferns to my

collection of the previous evening. Our journey of the first day to the place where we now halted was of very gradual ascent. To-day we commenced the *ascent proper* of the peaks. Leaving behind all that was not actually necessary to be taken with us, we commenced our journey by passing the little waterfall and walking up the bed of the stream along the gently sloping fall of a granite rock. The ascent of several parts of this was rather difficult, having to crawl up on our hands and knees. After half an hour's hard work we reached a comparatively flat wooded spot. On the steep part I collected in moist places an *Eriocaulon*, a *Gentiana*, and a few other curious little plants, and saw also a small *Drosera*, but could meet with none of it in flower. In passing through the wood above mentioned I saw great plenty of my new *Cactus* growing on the stems of the larger trees. Emerging from the wood we again encountered another steep place almost entirely covered with a large species of *Bromeliaceæ*, above which rose a few plants of a fine large scarlet-flowered shrubby species of *Salvia* and a pale blossomed *Virgularia*, while, twining among thin stems was a small-leaved and small white-flowered species of *Apocynæ*, of all of which I collected specimens. On a nearly bare portion of the rock I also found an herbaceous plant belonging to the natural order *Gentianeæ*. It grows from a foot to a foot and a half high, with thick succulent glaucous leaves, the upper ones connate, from out of which proceed about half a dozen pedicles each bearing a single flower. The inflorescence is large, the calyx much inflated and tinged with purple, particularly on one side. The pale yellowish-white corolla is nearly hidden by the calyx. The stamens are six. As I believe this to be the type of a new genus I have called it *Gastrocalyx connatus*. The seed-vessels were all too young to enable me to procure ripe seeds of it, a circumstance which I much regretted. Passing this place we again entered a wooded district of the mountain. Here we found many anta (tapir) paths, as we had also done the day previous, in the woods below along which we passed, thus rendering our progress much quicker than it otherwise would have been, as the branches above only required to be cut away to make a good road. Judging from the abundance of the tracks which we

here met with, the tapir must be a very common animal in this remote and solitary part of the mountains. Here they are as yet out of the reach of the hunter, who commits great havoc among those of the lower woods, and there is also abundance of herbage to supply them with food. In passing through this forest one of the blacks shot a *Jacutinga*, (*Penelope Jacutinga*, Spix), and I collected a few orchideous plants and specimens of a large yellow-flowered *Senecio*. Leaving this wood we came upon a slanting boggy piece of ground, in ascending which I found a fruticose proteaceous-like species of *Compositæ*, perhaps a *Baccharis*; a *Vaccinium* and *Andromeda* (?) both in fruit; two species of *Melastomaceæ*, one of them with large purple flowers and small leaves; abundance of the *Eriocaulon* which I met with further down; a *Utricularia*, a *Hyptis*, and a *Salvia*. Judging from the top of the mountain we were now at an elevation of more than five thousand feet. In the wood through which we last passed there were no large trees, and those of another which we had now entered were still smaller, the highest not exceeding fifteen or twenty feet. Leaving it we commenced the ascent of a very steep place covered with low shrubs, among which were three species of *Melastomaceæ* which I had not before found, a frutescent *Lobelia*, and at a considerably higher elevation the ground was principally covered with *Gaultheria hispida* (Sprengel), and a *Weinmannia*, of which I could only find three specimens in flower. The *Gaultheria* grows from two to three feet high, and the *Weinmannia* a little higher. We continued our way for more than an hour through this stunted vegetation, making but slow progress, although we were much facilitated by having the path of the tapir to crawl up. By following this tract we reached a point whence we had a beautiful prospect of the surrounding country, particularly to the eastward, where as far as the eye could reach it was one mass of conical shaped hills, one ridge only rising to a considerable elevation above the rest. The point which we had attained was the summit of one of the many peaks which form the range of the Organ Mountains. At less than a quarter of a mile distant stood the highest peak, and certainly not more than three hundred feet above us; but between the two peaks lay a densely wooded ravine

about two hundred feet deep. It being now two o'clock p.m. it was too late to think of ascending it that day; so I determined to remain where we were for the night and attempt it next day, but the blacks refused to do so on account of no water being nearer than a little above where we had slept the night previous. As I could not force them to remain, I was consequently, much against my will, obliged to abandon all idea of reaching the summit. Not having a barometer with me I took up a thermometer that I might ascertain the boiling point of water; but unfortunately broke the tube before I could do so. On the very top of the peak, a granite rock almost destitute of soil, I found a great patch of a large bulbous-rooted plant: it was not in flower, but had all the appearance of being an *Amaryllis*. I carried some away and have since sent home a good many roots of it. After partaking of a slight repast we commenced our downward journey, and reached our encampment just as evening was setting in. After preparing a little tea for myself I put my day's collection of specimens into paper, and again lay down wrapped in my poncho to enjoy some rest, being not a little fatigued with the toils of the day. At 6 a.m. next morning the thermometer indicated 47°. After breakfast I brought all my collection of parasites, bulbs, &c. together, and allotted to each negro his burden, the weight of which caused no little grumbling among them; but when they saw me load myself as heavily as any of them they said nothing. We started at 8 a.m. and followed the route by which we had come. The only thing which I picked up on my way back worthy of notice was a new species of *Zygopetalon* growing on the stem of an old tree. It is not so fine as either of the other two Brazilian species. Its petals and sepals are greenish-yellow, the labellum white, streaked at the base with purple. I have named it *Z. Murrayanum* in honour of my excellent friend Mr. Murray of the Glasgow Botanic Garden. At 4 o'clock p.m., groaning under our loads, we reached the fazenda.

Being anxious to obtain a few more plants of the new *Cactus*, and also a larger stock of those bulbous plants which I had met with on my visit to the mountains, as well as to add more specimens to my collection of dried plants, I made prepara-

tions on the evening of the 14th of May for starting on the following morning. On this journey I was again accompanied by my old guide "*Pai Phelipe*" and the other three blacks. We left the fazenda at 8 a.m. and reached our former encampment at 3 p.m. After dinner I went out to botanize, taking three of the blacks with me. One of them I left at the little water-fall to collect bulbs of the *Amaryllis* formerly mentioned as growing there; the other two accompanied me to assist in collecting specimens; and I was thus enabled to add considerably to my previous stock; but the only new thing I met with was a species of *Melastomaceæ*, a tree about ten or twelve feet high covered with small white flowers. After getting all my specimens put into paper I once more lay down on a few palm leaves covered with my poncho to pass the night. We arose next morning by break of day, when I found the thermometer at 50°. As there was little to be had on the top of the mountain but the bulbous roots already mentioned, I sent two of the blacks up to bring as many of these as they could carry, intending myself to walk slowly with the other two to the bog in which I formerly found the *Vaccinium*. During my walk I gathered plenty of *Cereus Russellianus*. This plant is a good example of nearly allied species representing each other in different regions. During the four times that I passed through the woods in my journey to and from the mountains, I always found *Cereus truncatus* confined to the dense virgin forests below the elevation of 4500 feet, while from that point to nearly 6000 feet *Cereus Russellianus* alone was seen. Little new was added to my number of species on this visit, but I much increased my former limited stock of specimens. Early in the afternoon the two blacks and myself returned to the spot from whence we had started loaded with collections. The day was one of the most delightful I ever remember to have witnessed, quite like one of the finest days of an English summer. The sky was clear and unclouded, and the atmosphere being free from that haze which often in the finest weather renders the view of distant objects indistinct, allowed us to obtain a perfect and well-defined prospect of the outline of the high mountains far to the eastward. Shortly after the other two blacks returned from the top of the mountains.

One of them brought me a single specimen of a beautiful little *Alstr meria* in flower. I had observed it on my former visit, but the few plants which I then met with were in fruit, and as the seeds were ripe I carefully preserved them. Having got all my specimens safely put into paper, I lay down shortly after seven, little dreaming what a miserable night I was to spend. I had just fallen asleep when I was suddenly awakened by a deluge of rain which was pouring down. One of those sudden and heavy showers which are only witnessed in tropical countries had commenced. Had we been in an open place we might have seen it approaching and been able to reach some shelter before it came on, but the tops of the trees by which we were covered had prevented this. I never was abroad in such weather. In a few minutes our large fire was extinguished and the place was swimming. I had laid a small bag of *Amaryllis* roots under my head as a pillow, which I now was obliged to use as a seat, after having covered myself with my poncho, which although a good one was but a poor protection for such a night. In half an hour the small stream beside us, which during the day had only a few inches of water, came pouring down like thunder. To add to our misery, the night was pitch-dark, so that we could not see to remedy our situation. What a night I spent may be imagined when I mention that I sat in one position from half-past seven in the evening till nearly three the next morning, under an incessant deluge of rain. A more perfect picture of patience I flatter myself could not be witnessed. About three it began to abate a little, and being in a shivering condition from the cold and wet, we made several attempts to kindle a fire, but without success ; everything being too wet to burn, and we were therefore obliged to content ourselves without one. By seating myself at the root of a tree, and leaning my back against it, I managed, at four different intervals, to obtain about an hour's sleep, but constantly awoke, cold and shivering. Never was I so glad as when the first rays of daylight were seen streaming through the trees ; and as soon as we could see, we lost no time in preparing to return home. Shortly after we started the rain began, and continued till we reached the fazenda, which we did at two p.m. On my way home I col-

lected a few specimens of a digitate-leaved species of *Mikania*.

Up to the beginning of June I still continued to add to my stock of dried specimens, and on the 9th of that month left the mountains, with all my collections, for the city of Rio de Janeiro.

GEO. GARDNER.

Rio de Janeiro, July 14th, 1837.

XVIII.—*Contributions to the Natural History of Ireland.* By WILLIAM THOMPSON, Esq., Vice-President of the Belfast Natural History Society.

No. 6.—*On the Birds of the Order Insectores.*

[Continued from p. 26.]

THE PIED WAGTAIL, *Motacilla alba*, Linn.*—Is a common species in this country, and though said to leave the northern to winter in the southern parts of England, is in the northern counties of Ireland permanently resident. One disposition towards a movement may however be witnessed, which is their collecting in the autumn in flocks, commonly consisting of about thirty individuals. Thus have I seen them at the end of September, on the borders of Lough Neagh, and have so observed them come to roost upon the reeds (*Arundo phragmitis*), and the adjacent ground, on the banks of the river Lagan, until after the middle of November; but I am not aware whether the portion of these birds so congregated ever move southwards. Mr. R. Ball has likewise observed them in large flocks in the south of Ireland about Youghal, during the month of October. Towards the end of January the song of the wagtail is frequently heard in the north, and occasionally

* The pied wagtail of Ireland is identical with the *M. alba* of British authors generally, and with the *M. Yarrelli* of Mr. Gould. By this author a new name has been applied to it, as he states, in consequence of a species peculiar to the temperate portion of continental Europe being the true *M. alba* of Linnaeus, and from which the British species is distinct. (Mag. Nat. Hist. vol. i. p. 459, New Series.) The two characters which form the description of *M. alba* in the 'Systema Naturæ,' are found in our bird. These are "pectore nigro, rectricibus duabus lateralibus dimidiato oblique albis," t. i. p. 331, 13th ed.

so late as in October. The situations generally known to me as selected for its nest were on the ground beneath piles of loosely heaped stones, the eggs four in number, and as described by Mr. Selby. A nest examined by my relative was, excepting some thread and bits of cloth in its foundation, entirely formed of cow and horse hair.

Montagu remarks of this species (Orn. Dict.), "as the weather becomes severe, they haunt marshes subject to the flow of the tide. In such places on the coast we have seen them in abundance, when none were to be found inland." In the north of Ireland they are always to be met with in the interior of the country, and in the most genial seasons of the year frequent the sea-side when the tide has ebbed. Like the dunlin (*Tringa variabilis*), and birds of similar habits, I have in some localities observed them daily attend upon the flowing tide in autumn. During the breeding season they have occurred to me on small and low rocky islets in the sea.

The wagtails are very general favourites. It is interesting to observe their confidence in man, which is especially shown in their closely following and keeping pace with the plough and harrow, when the loud calling of the driver to his horses or other noise they heed not, as if knowing it is not addressed to them. In thus feeding, one manner only of taking their prey is resorted to; but elsewhere, when winged insects are the objects of pursuit, we may see in addition to running, both leaping and flying adopted; in the last they resemble the spotted fly-catcher, and through the air I have seen them pursue insects as far as this species. It is amusing to behold what appears to be their playfulness of manner towards other birds, and the reception it meets with from them. Thus have I seen one fly out to sea after a king plover (*Charadrius hiaticula*), and strike at it several times, the latter exerting all its powers to avoid it, as if the wagtail, not more than half its weight, were a bird of prey. Again, when one of these birds and a yellow bunting were feeding near each other, the wagtail gave chase to the latter, and after taking many turns, through all of which they maintained a regular distance of about a foot from each other, they alighted peaceably on the same stone; the chase thus seeming to have been undertaken for

mere diversion. On another occasion I saw a pair of wagtails pursue, to its great annoyance, a poor bat (*Vespertilio Pipistrellus*?) that untowardly appeared during one of the dark days of December (9th, 1832).

GRAY WAGTAIL, *Motacilla Boarula*, Linn.—This beautiful and graceful species, though much less common than the last, is extensively, but not universally distributed over Ireland. Like the pied wagtail it is permanently resident throughout the country, whilst in the north of England it is known only as a summer, and in the south* (in general terms) as a winter visitor. For many years I have remarked its presence during every winter in the counties of Down and Antrim, and about the mountain rivulets as well as those adjacent to the sea. When by frost and snow the woodcocks have been driven from the mountain heaths to the covers, and the snipes from the marshes to the unfrozen springs, I have observed the gray wagtail in its summer haunts about the ponds at the mountainous locality of Wolfhill. At this season and late in the autumn it is occasionally seen in places of a very different character—in the extensive tan-yards, &c. of Belfast.

The situations generally selected for the nest are holes in walls, those of bridges, about mill-wheels, or otherwise contiguous to water being preferred. In the romantic glens they also build, and for this purpose a pair generally resorts to a fissure of the rock beside a picturesque cascade at "the Falls," just such a place as would be chosen by the water-ouzel. On the 18th of March my relative has observed a pair of these birds apparently contemplating nidification, by minutely examining their former breeding haunts, and on the 12th of May has seen the young of the first brood on wing, though still requiring their parents' aid to feed them. The nest is generally formed of grasses and lined with horse-hair. I have invariably remarked the female as well as the male to possess the black mark on the throat in the nuptial season. After Montagu and Selby it may seem unnecessary to allude to this, but Temminck's having described it as characteristic of the male only,

* On August 28th I saw it in the gravelly bed of the river at Dole in France. In the third week of March I have remarked it at Ogley Pool, North Wales.

has induced the observation. Throughout the winter the gray wagtail generally keeps in pairs; in autumn only have I seen a whole family, and never more together. Their prey is taken by the different methods described in the notice of the last species. About the head of mountain springs I have frequently observed this attractive bird, but knew not the object of its pursuit in these interesting spots, until the examination of the stomach of one in the month of December proved it, at least in one instance, to have been the minute river limpet, *Ancylus fluviatilis*, of which it contained many specimens. In so far as the haunts of *M. alba* and *M. Boarula* are regarded, I cannot see the advantage of Cuvier's division of the wagtails into two genera. Under *Budytes*, a name suggested by its being often seen among cattle (*Rég. An. t. i. p. 391*, 2nd ed.), he ranks the gray, and under *Motacilla*, which is stated generally to be seen about waters, is classed the pied; but, according to my observation, if either bird should in general terms be described as frequenting pastures, and hunting insects among the flocks, it should be the *M. alba*; and if hunting the vicinity of waters should be regarded as characteristic of the one rather than the other, it should be of the *M. Boarula*. The "form" of *M. flava* renders the propriety of his sub-genus more obvious.

YELLOW WAGTAIL, *Motacilla flava*, Ray.—Mr. Templetou has remarked that this species is "a rare summer visitant, appearing more commonly about Lough Neagh than elsewhere." From the observations of ornithologists in various parts of the country, it seems to be generally a rare species. To myself it has in Ireland* occurred but once in a wild state, on June 24, 1832, in a turf bog on the confines of the county Donegal, a few miles from the city of Londonderry. But once has it been seen by Wm. Sinclair, Esq., when, on April 28, 1833, a single individual appeared, and on that day only, at "The Falls." In the collection of T. W. Warren, Esq. of Dublin, I have seen a specimen† which was shot at Finglass, near that city,

* In England I have seen it in the month of July about the lakes of Hawes-water and Windermere.

† This is the true *M. flava* as distinguished from the *M. neglecta* of Gould.

about the 20th of April, 1835 : it is the only individual that has come under this gentleman's observation. A specimen set up by Mr. Wm. S. Wall, of Dublin, is stated to have been shot in the vicinity of the Custom-house in May, 1837. In the southern counties of Cork and Kerry it has not been met with by my correspondents.

MEADOW PIPIT, *Anthus pratensis*, Bechst.—This bird is very common in Ireland, from the meadows adjacent to the sea-shore, and occasionally the shore itself, to the mountain tracts of the very greatest elevation. It is permanently resident, but suffers much from severe frost and snow, and during such times is occasionally driven for food to the streets of Belfast, where it has been noticed after even two nights of frost. I once saw a meadow pipit walk into the sea and deliberately give itself a complete washing. It is mentioned by my relative that one of these birds feigned being wounded for the purpose of withdrawing his attention from its nest. My friend at Cromac has frequently found the nest of the meadow pipit on the banks of water-courses and drains, as well as on the ground in fields. One which was known to him at the side of a drain was discovered by some bird-nesting boys, who pulled the grass away that concealed it. On visiting it the next day, he observed a quantity of withered grass laid regularly across the nest ; on removing this, which from its contrast in colour with the surrounding herbage he considered must have been placed here as a mark by the boys, the bird flew off the nest ; and on his returning the following day he found the grass similarly placed, and perceived a small aperture beneath it, by which the bird took its departure, thus indicating that the screen which harmonized so ill with the surrounding verdure had been brought there by the bird itself. The same gentleman once introduced the egg of a hedge accentor into a meadow pipit's nest, containing two of its own eggs ; but after a third egg was laid, the nest was abandoned.

The stomach of one of these birds, examined by me in December, was chiefly filled with minute coleopterous insects, but also contained worms, minute fragments of brick, and two perfect specimens of the shell *Bulimus lubricus*. This pipit

is commonly called "moss cheeper" in the north; by the name of "we keên" it is known in Kerry*.

ROCK PIPIT, *Anthus aquaticus*, Bechst.—Although this species does not appear, in Mr. Templeton's published Catalogue of the Irish Vertebrata, known to his father (Mag. Nat. Hist., vol. i. new series), I find by reference to the MS. that he was acquainted with it. Under the name of *Alauda petrosa* it is remarked, "common about the rocks on the shore." The rock pipit is found on the coasts of Ireland throughout the year, and has on those of the north, west, south, and east occurred to me. It is nowhere more plentiful than about the rocky marine islets, of which the south islands of Arran, by reason of their extreme western position (off the coast of Clare), may be particularised.

With the following observations of Montagu my own entirely agree. He remarks of the rock pipit that "it seems wholly confined to the neighbourhood of the sea, and is never found, even in winter, more remote than the contiguous marshes within the occasional influx of the tide, depending chiefly on marine insects for its subsistence, and has never been observed to be gregarious." (Art. Rock Lark in Orn. Dict.) Mr. Selby has observed it to be "strictly confined to the rocky and abrupt shores:" (Ill. Brit. Orn., vol. i. p. 259.) but close to the town of Belfast it frequents a coast of the very opposite character, as on the lowest and most oozy part of the beach; it may always be seen about the *rejectamenta* of the tide, consisting chiefly, in the situation alluded to, of the *Zostera marina*, the accumulated masses of which form the chief

* *Anthus arboreus*, Bechst. On April 12, 1827, I for some time gave attention to a bird at "The Falls," that, for general appearance, manner of singing, &c., as described by Mr. Selby, I concluded must be this species. One or two ornithological friends have likewise similarly seen a pipit, which they presumed to be the *A. arboreus*, but specimens have not been obtained for examination that its identity might be determined. It is probably the tree pipit that is alluded to in the following passage from Smith's History of Cork, published in 1774 (p. 338, 2nd ed.): "The *Alauda pratorum*, Aldrov., or titlark, which is in England a bird of passage, is a stranger to Ireland. Dr. Rutly informs me that an eminent bird-catcher is now introducing them as a novelty in Dublin, being much esteemed for their sweet note. Another species, called the pippit or *Alauda minor*, whose legs are yellow, and a smaller kind of lark, is a constant attendant to the cuckoo, as a good bird-catcher assures us."

attraction. To stony embankments, piers, and similar erections it is likewise partial. These Temminck mentions it to frequent in Holland; but part of his remarks on the *Anthus aquaticus* are very different from those of British authors*. In pursuit of food we find most of the true shore birds (Grallatores) frequenting the bare beach, whether oozy, gravelly, or sandy, but the rock pipit generally seeks its sustenance either on the masses of seaweed which when growing are exposed at ebb-tide, or on those which have been cast ashore.

When looking for the nests of terns upon the Mew Island, off the coast of Down, on the 13th of June, I discovered one of the rock pipit; this was entirely composed of fine grasses, which also served for lining. It was on the ground, at the base of a narrow ledge of rock, and contained three eggs; these were greenish white, closely and pretty uniformly speckled all over with pale brown. The specimens of this bird, which I have critically examined, correspond with Temminck's description of the young birds of the year.

THE WHEAT-EAR, *Saxicola Œnanthe*, Bechst.—Is a regular summer visitor to and commonly distributed over Ireland and the surrounding islands. Nowhere have I observed it in greater numbers than in the extreme north-west; and when visiting the largest of the south islands of Arran on the 8th of July, 1834, accompanied by Robert Ball, Esq., it was the only land bird of passage we met with. In the north the wheat-ear is generally the earliest of the summer birds in its arrival, appearing in the last week of March; to this, however, the late spring of 1837 proved an exception, the 15th of April being the earliest date of its occurrence known to me about Belfast. By my correspondent in Kerry it has not been seen before the 25th of March. Although it is not the disposition of this species to congregate, about a dozen were on April the 3rd, 1836, observed together contiguous to the sea near Belfast,

* Temminck observes under "*Habite*: particulièrement le midi de l'Europe, où il niche; seulement de passage dans les provinces tempérées, le long des bords des eaux et des fleuves, aux environs de Paris. . . . Niche dans les pays en montagnes, même sur les plateaux stériles de celles qui sont très-élevées, comme les Pyrénées et autres; plus rarement sur les falaises et sur les rocs qui bordent la mer." Man. Orn. Eur., part 1, p. 267, 2nd ed. Again, in Part 3 of this work it is remarked, "Vit en Suisse et sur le Rhin," p. 189.

and from so appearing at this season they had very probably migrated in company. Throughout our wild mountain pastures, as well as the rabbit-burrows and sand-hills that skirt the coast, the wheat-ear is found in its season, and in the first-mentioned localities, where even at the most genial period of the year we see but few of the feathered tribe, is highly attractive from the beauty of its plumage, lively habits, and variously uttered song. In such situations it nestles in old stone walls. The eggs I have examined, in form, size, and colour strongly resemble those of the hedge accentor, but on minute inspection differ from the uniform bluish-green colour of the eggs of this species, in being faintly speckled with very light brown.

During the first week of October I have seen wheat-ears in the vicinity of the sea in Downshire, but have never known any to be met with in the winter, as they are "in many parts of the south of England" (White's Selborne, p. 257, &c. ed. 1837); nor are they ever specially looked after for the table in the north of Ireland; indeed, for this purpose the species does not appear here in sufficient numbers. In his Natural History of the county of Dublin, Rutly remarks that "it is excellent food and very fat, and for its delicacy is by some called the Irish ortolan" (vol. i. p. 313).

THE WHIN-CHAT, *Saxicola Rubetra*, Bechst.—Like the wheat-ear, is a regular summer visitant to this country, but is much less diffused; besides, its places of resort contribute to render it still less known than, as a regular bird of passage, it might be. These about Belfast are chiefly the base of the mountains and the adjacent fields. It is in the north of Ireland, as elsewhere in the British Islands, considerably later in its arrival than the wheat-ear. In Mr. Stewart's catalogue it is described as common in Donegal*, and so it is also stated by Mr. Neligan to be in Kerry. This gentleman has remarked to me that the whin-chat is very partial to alighting on docks (*Rumex*) in the meadows it frequents, and that every summer it resorts to the same fields. In 1832 and 1833 the whin-chat was seen by the Rev. T. Knox about Killaloe, where he consi-

* From the adjoining county of Fermanagh, as well as in Donegal, I have seen specimens.

ders it rare. The stomach of one which came under his inspection was, excepting a caterpillar, filled with flies and beetles.

THE STONE-CHAT, *Saxicola Rubicola*, Bechst.—Is resident and common throughout Ireland. Around Belfast it equally frequents the old ditch-banks, covered with the sloe and other shrubby plants, that surround the lowest-lying meadows, and the furze, or whins, or other cover on the mountain sides. In the earliest of the mild days of spring its song is heard. At the end of April I have seen the parents carry food to their young. My friend at Cromac has found its nests both in low bushes and on the ground, but only once in the latter situation. The stomach of one of these birds, sent to me in December, was entirely filled with minute coleopterous insects. Temminck remarks that the stone-chat is resident in Africa, but in Europe is a bird of passage.

GREAT TITMOUSE, *Parus major*, Linn.—This is a common species in Ireland, and is resident, like all the other titmice found in the country. Town plantations, as well as those in the country, are frequented by this bird. I have also remarked it in districts destitute of trees, and where white-thorn hedges afforded it the only shelter. Soon after the middle of December its song is generally commenced in the north. During last winter a pair of these birds, along with two blue titmice, daily visited the window-sill of a friend's house in the country, at a particular hour, when crumbs of bread were left there for them. The latter species only has renewed its visits in the present winter. The stomach of a *Parus major*, examined by me at the end of March, contained some seeds and the remains of coleopterous insects.

BLUE TITMOUSE, *Parus cæruleus*, Linn.—This is the most common species of titmouse in Ireland. In the ordinary places of resort its lively and varied attitudes have often been described. In winter, whether mild or otherwise, this species is very partial to the reeds fringing the river Lagan. The force of one of these birds flying upon a reed sways it with a graceful bend almost to the water, in which the lower portion is immersed, but the bird nevertheless retains its grasp; then betaking itself to another, rapidly runs up its stem from near the base to its point, and almost dips into the river again. In

addition to its more ordinary haunts it feeds pretty much on the highways, and occasionally builds in the walls of town gardens.

These birds are known to suffer considerably from the cold of winter, and when kept in the house are also very sensible to it. One in the possession of my friend at "the Falls," when let out of the cage in summer roosted upon its top; but in winter, although in a warm room, selected the hottest place for the night in which it could remain in safety, roosting under the fender, which afforded it at the same time sufficient space and shelter. This bird is from its familiarity and vivacity most amusing. Its cage is covered with close netting, which it has several times cut through and effected its escape into the room, when it flies to the children, and if taking hold of a piece of bread or cake in the hand of the youngest, will not forego the object of attack, though shaken with the greatest force the child can exert, and on one occasion so persecuted her for a piece of apple that she ran crying out of the apartment. It is especially fond of lump sugar. Confined in the same cage with it are some other birds, and amongst them a redbreast, which it has sometimes annoyed so much as to bring upon its head several chastisements, but in such cases the redbreast acted only on the defensive. Its favourite trick is to pull the feathers out of its fellow prisoners, and by so doing, it sadly tormented the young willow wren before mentioned, and made the same attempt even on a song thrush lately introduced to its domicile, but by this bird it was successfully repelled. It escaped out of doors several times, but always returned without being sought for. The titmouse often falls a victim to ignorance in this country as it does in England, in consequence of the injury it is supposed to do to fruit trees. Mr. Selby most justly pleads in favour of its being a friend rather than an enemy to the horticulturist; and Mr. Knapp, treating of the species very fully in his most agreeable manner, is indignant that it should in these days be ranked as vermin, and a reward be offered for its head. In the stomachs of two specimens killed in March and December, I found coleopterous and other insects. "Blue-bonnet" is the common name of this species in the north of Ireland.

MARSH TITMOUSE, *Parus palustris*, Linn.—In Smith's

History of the County of Cork it is remarked, "Besides this species (*Parus major*), there is also the cole titmouse, the black-cap, the blue titmouse or nun, and the long-tailed titmouse" (vol. ii. p. 340, 2nd edit.). If we take for granted that the term "black-cap" is correctly applied to a *Parus*, the marsh titmouse must be considered the one that is meant. This species is not commonly distributed in Ireland. In a very few instances only has it occurred to me around Belfast, and not in any other locality. By two ornithological friends it has been met with but once or twice, and though within a few miles of the town, the localities and times of appearance were always different. By R. Ball, Esq., it has been seen only about Ballitore in the county of Kildare. In the collection of T. W. Warren, Esq., a native specimen is preserved, which was shot in the Phoenix Park near that city.

COLE TITMOUSE, *Parus ater*, Linn.—Montagu and Selby state that this species is less numerous in England than the *P. palustris*, but in Ireland the relative proportion of the two species is very different. To one only of my correspondents is the latter known with certainty, but all who have bestowed much attention on the subject attest the presence of the cole titmouse in their respective counties, viz. Donegal, Clare, Kerry, Cork, Tipperary, and Dublin. In the north generally, and wherever I have been in suitable localities throughout the country, it has occurred pretty commonly. Seeds as well as insects, &c. form a portion of its food. In a plantation consisting chiefly of the common pine (*Pinus sylvestris*) and the alder, I once in the middle of December for a considerable time observed some of these birds, accompanied by the gold-crested regulus and lesser redpole (*Fringilla Linaria*). They were all occupied in flying from one alder to another, and were intent on procuring the seed of this tree only. The various attitudes of these three beautiful species were highly interesting, as the light bunch of pendent seed admitted not of their being stationary for a single moment. To observe a troop of titmice comprising three or four species, in addition to the gold-crested regulus, and occasionally one or two others of our smallest birds, moving about in company, now pausing as if to display their graceful attitudes on a few adjacent trees, then filing rapidly through the thickest plantations with the *esprit*

du corps of one species, has always been to me, but especially in the wintry wood, a source of much attraction, and at such times their shrill little notes, evidently more than sight, serves to keep them together. The following note appears in my journal under the date of November 19, 1833:—Being in Colin Glen to-day, I as a matter of course saw the gold-crested regulus and the blue and cole titmice in company. I was amused on observing both species of *Parus* cling to the centre of the under side of the leaves of the sycamore (*Acer Pseudo-Platanus*) still attached to the trees, and describe a circle with their bills by picking with extreme rapidity all round them, during which operation their weight brought not to the ground a single leaf, though all were “sere and yellow.” The stomach of one of these birds which came under my inspection at the end of March, in addition to fragments of stone, contained only seeds.

LONG-TAILED TITMOUSE, *Parus caudatus*, Linn.—This interesting bird, though not a well-known species in consequence of its retired and wooded haunts, has long since been recorded as indigenous to Ireland; and as such, appears in the county histories of Cork (Smith’s) and Londonderry. Rutly in his Natural History of Dublin remarks, that it “was found in the county in the winter of 1768.” It is at present less known in the south than in the north; over which it is diffused, but not very plentifully. None of my correspondents resident in the province of Munster have seen this bird in its native haunts; but in the vicinity of Cahir, county of Tipperary, it is stated to occur. Mr. R. Ball observes, that the long-tailed titmouse is not uncommon about Dublin, though around Youghal, his former place of residence, he never met with it. Of late years its numbers seem to have increased considerably throughout the north*. To the late Mr. Templeton it occurred only twice; but within several miles around Belfast this titmouse has for some years past been seen wherever there is a sufficiently great extent of wood, this alone being apparently the essential requisite to the species; as it equally inhabits the plantations of the mountain glen,

* At the same time their numbers fall greatly short of those of *P. corvulus*, which in Mr. Sampson’s catalogue of the Birds of Londonderry is said to be less frequent than the *P. caudatus*.

those around the beautiful seats which adorn the shores of the bay and of the most highly improved demesnes in the valley of the Lagan: a family of these birds appear particularly interesting when flitting over the waters of the river and about the overhanging trees that border it. When the beautiful rosy hue of its breast is conspicuous, it adds much to the attraction of this species. The first of these birds I ever saw excited my attention by its peculiar note uttered when stationary, and though different from that of the others, had a generic similarity which satisfied me that it must proceed from some species of *Parus*. Its call when in motion is soft, thus differing from the shrill little voices of some of the same genus, with which it seems less to consort than with the gold-crested regulus.

On May 13, 1832, my relative describes, as an amusing spectacle, a pair of these birds, which he saw feeding seven young ones, which having left the nest were clustered together on the branch of a tree within the space of about six inches. The manner in which a family of long-tailed titmice crowd together for warmth during snow and in the cold wintry night has been well described; (vide *Habits of Birds*, p. 60, and note to p. 171 of White's *Selborne*, ed. 1837,) but that it is the ordinary habit of the species, and not consequent on the piercing breath of winter, is indicated in the following note from my journal, under the date of July 5, 1833. Mr. Wm. Sinclair remarks, that some days ago he was much entertained by observing a family of about ten or twelve long-tailed titmice going to roost in company, when each individual endeavoured to get as near the middle of the group as possible, and that enviable situation was no sooner attained by a few than those from the outskirts used all their efforts to insinuate themselves between them, and foiled in this, next exerted their powers to avoid being placed outside—in all respects just the winter practice. A similar procedure on the part of the gold-crested regulus is described by Mr. Herbert in a note to White's *Selborne*, (p. 180, ed. 1837.). So many as twenty long-tailed titmice have twice been reported to me as seen in company. The stomach of one, which came under my examination in the month of January, was filled with insect food, of which some

minute beetles were perfect. M. Temminck describes the female only as having the black streak over the eyes; Mr. Jenyns considers it common to both sexes: in nine specimens of *P. caudatus* now before me, this marking is apparent, but in some individuals is much better defined than in others; in one only of them the sex was observed, when it proved to be a male bird: of this sex it may fairly be presumed are others of the remaining eight individuals*.

BEARDED TITMOUSE, *Parus biarmicus*, Linn.—Of this bird I have never seen a native individual, and can only repeat the short notice of it as Irish communicated by me to the Zoological Society of London in 1834. “Mr. W. S. Wall, bird-preserved, Dublin, who is very conversant with British birds, assures me that he received a specimen of this *Parus* from the neighbourhood of the river Shannon a few years since.” Zool. Proc., 1834, p. 30. Bewick’s admirably characteristic woodcuts of birds are of constant reference with Mr. Wall.

BOHEMIAN WAX-WING, *Bombycivora garrula*, Temm.—Mr. Templeton has said of this bird: “Sometimes seen about Belfast, but more common in Tullamore Park, county Down; has been several times† shot in the county of Derry.” Mag. Nat. Hist., vol. i. p. 405, N.S. By a veteran sporting friend the wax-wing has twice been obtained in the neighbourhood of Belfast, and in both instances in wooded glens within the district of the Falls. One of these birds was shot rather more than twenty years ago, and the other considerably before that time, and when severe frost and snow prevailed. Mr. R. Ball informs me, that about 1820, one was killed at Castle Martyr, in the county of Cork. “In the winter of 1822-23, a specimen of the *Bombycilla Bohemica*, Briss., was found dead in the woods of Burton Hall, in the county of Carlow.” Zool. Journ., vol. i. p. 590. Dr. J. D. Marshall has noticed an individual which was shot in the neighbourhood of Dublin in

* Families of the long-tailed titmouse have frequently been seen by a sporting friend on the wooded banks of the river Stincher in Ayrshire.

† In the late Mr. Templeton’s MS. the word “once” is used in the place of “several times” in the printed Catalogue. Another instance of the wax-wing’s occurrence in Ireland has been made known to me since the above was written. The specimen was shot about the winter of 1825-26, in the Castle-reagh Hills, county of Down.

1829, Mag. Nat. Hist., vol. ii. p. 394. In the Belfast Newsletter of Dec. 20, 1831, the following paragraph appeared:—"In the early part of last month a beautiful specimen of the Bohemian wax-wing (*Bombycilla Bohemica*, Briss.), was shot in Newtownlimavady. It was perched upon a rowan tree in a garden, and seemed busily employed in picking off the berries; many of them were found in its craw when it was opened." In the collection of Dr. R. Graves of Dublin, I have seen one which was killed in Ireland. On Feb. 6, 1835*, an extremely beautiful individual of this species was shot in a garden at Ballymacarret, in the suburbs of Belfast, and on the following day another was seen at the same place. The former, which came under my inspection, proved on dissection to be a female; its stomach, which I did not examine until the 10th, four days after its death, was entirely filled with the hairs of the white-thorn (*Crataegus Oxyacantha*), which possessed an odour as fresh as if just plucked from the tree. Each wing exhibited six plumelets, with their scarlet wax-like adornments; some authors have described the female as wanting these altogether, and the greatest number I have seen attributed to her are four or five. (Temm.) In a few other instances, but without particulars, I have had reports of the wax-wing's occurrence in Ireland.

XIX.—On a New English Species of *Urtica*. By CHARLES C. BABINGTON, M.A., F.L.S., F.G.S., &c.

At a recent meeting of the Cambridge Ray Club my attention was drawn (by the Rev. Dr. Jermyn,) to the fact, that two very distinct plants existed in our native herbaria under the name of *Urtica pilulifera*, Linn., and I can only account for our not having previously observed their differences from the circumstance, that English specimens of the true plant of Linnaeus do not exist in the collections of Cambridge botanists.

Upon further examination I was much pleased by finding that one of these plants was the true *U. pilulifera*, and that

* Just at this time a specimen was mentioned in the papers to have been shot near Alcester in England.

the other exactly corresponded with the *U. Dodartii* of Linnæus, of which there is a specimen in the University Herbarium, ticketed as the plant of Dodart by the elder Martyn, and also another with the Linnæan description appended in the hand-writing of the younger Martyn. In the Linnæan Herbarium there is a specimen which quite accords with our native plant, but its locality is unknown. Dodart's original figure agrees very well with our plant, as do the descriptions of all the authors to which I have been able to refer. In Smith's Herbarium there is a specimen, marked *U. Dodartii*, Martigny, Switz. in Herb. Davall, which differs from our plant by having the leaves slightly serrated.

I now proceed to give the characters and descriptions of our two plants.

1. *U. Dodartii*, Linn. Foliis oppositis ovatis ovato-lanceolatisve subintegris, stipulis lanceolatis, glomerulis fructiferis globosis pedunculatis, seminibus sublævibus.

U. altera pilulifera parietariæ foliis, *Dod. Mem.* 131. plate.—*U. Dodartii*, *Linn. Sp. Pl.* 1395. *Willd. Sp. Pl.* 4. 347. *Enum. Hort. Berol.* 966. *Sm. in Rees' Cyclop.* v. 37. *Aiton. Hort. Kew.* 5. 262. *Reichen. Fl. excurs.* No. 1106.

Stems erect, numerous, cylindrical, hollow, leafy, 2—3 feet high. Leaves ovate or slightly ovate-lanceolate, very nearly entire, (in Martyn's specimens, gathered in the Cambridge garden, September 1761, and in one of those in Smith's Herbarium, they are decidedly serrate, but not in the same peculiarly coarse way as in *U. pilulifera*;) 3—5 ribbed at the base, on long stalks. Stipules small, narrowly lanceolate. Peduncles axillary, two together. Male flowers on a slender common peduncle, which is longer than the petiole, and has two or three longish branches springing from the axil of a minute lanceolate bractea; at the base and extremity of each branch there is a cluster of very shortly branched flowers.

Female flowers on a simple stalk which is shorter than the petiole, in a dense globular head. Seed brown with numerous dark purple dots, nearly smooth and shining.

Locality, Copford, Essex, *Rev. W. Whitear*; Upwell, Norfolk, *Rev. L. Jenyns*; near Wisbeach, Cambridgeshire, *Rev. Dr. Jermyn*. The stations given by Reichenbach, who I believe

to be the only author that has mentioned its native country, are near the Hague, near Delft, and in Friseland.

Doubts have been thrown upon the truly native character of this plant, and also of *U. pilulifera*. It appears not improbable that they may both have been introduced into this country at some former time. But as this is uncertain *U. Dodartii* has an equal claim to be considered as a native of England with *U. pilulifera*, which has long been introduced into our lists.

2. *U. pilulifera*, Linn. Foliis oppositis, latè ovatis cordatisve acuminatis grossè dentatis, stipulis oblongo-ovatis, glomerulis fructiferis globosis pedunculatis, seminibus punctato-tuberculatis.

U. pilulifera, Linn. *Sp. pl.* 1395. *Eng. Bot.* 118. *Sm. Eng. Fl.* 4. 131. *Wallr. Sched. Crit.* 188. *Reich. Fl. excurs. no.* 1105. *Koch. Syn.* 635.

Stems erect, bluntly quadrangular. Leaves broadly ovate, usually cordate at the base, the margins deeply cut into large divaricated teeth, much larger than those of *U. Dodartii*, and on longer and thicker stalks. Stipules oblong-ovate, broader than in the preceding. Fruit stalks very short, scarcely exceeding the diameter of the large globular head. Seed dark brown with numerous darker prominent points, rather opaque.

Locality, in the counties of Norfolk and Suffolk.

Owing to the want of English specimens the description has been drawn up from the comparison of two foreign specimens (one No. 22 in Reichenbach's *Fl. Germ. Exsic.* communicated to that work from Thuringia by Wallroth, the other from Rome, gathered by W. C. Trevelyan, Esq.) with the plate in *Eng. Bot.*

The specimen of *U. Velearica* in the Linnaean Herbarium appears to be nothing more than a larger leaved form of this species, notwithstanding its usually cordate base to the leaves. Both the specimens mentioned above, and also the plant in Smith's *Herb.* from Hungary, are rather the *U. Velearica* than the *U. pilulifera* of Linnæus. I have never seen specimens with the leaves so decidedly rounded (not at all cordate) at the base as in the original plant of the *Linn. Herb.* It is much to be wished that botanists resident in the eastern counties would pay attention to these plants, in order that we may obtain information concerning their variations, and also their

real claim to be considered as native, not naturalized, plants in this island. I may add that some botanists consider both these plants to form only one species. This last is a question well worthy of experimental inquiry.

St. John's Coll. Cambridge, March 30, 1838.

XX.—Notices of British Fungi. By Rev. M. J. BERKELEY, M.A., F.L.S.

[With two Plates.]

(Continued from No. III. Mag. of Zool. and Bot., vol. i. p. 513.)

*59. *Agaricus fulvus*, Bull. Dec. Fl. Fr. vol. ii. p. 186. The form described in the English Flora is that with pallid gills noticed by Retz. The present season has afforded a few specimens in which the gills and inside of the stem were more or less yellow.

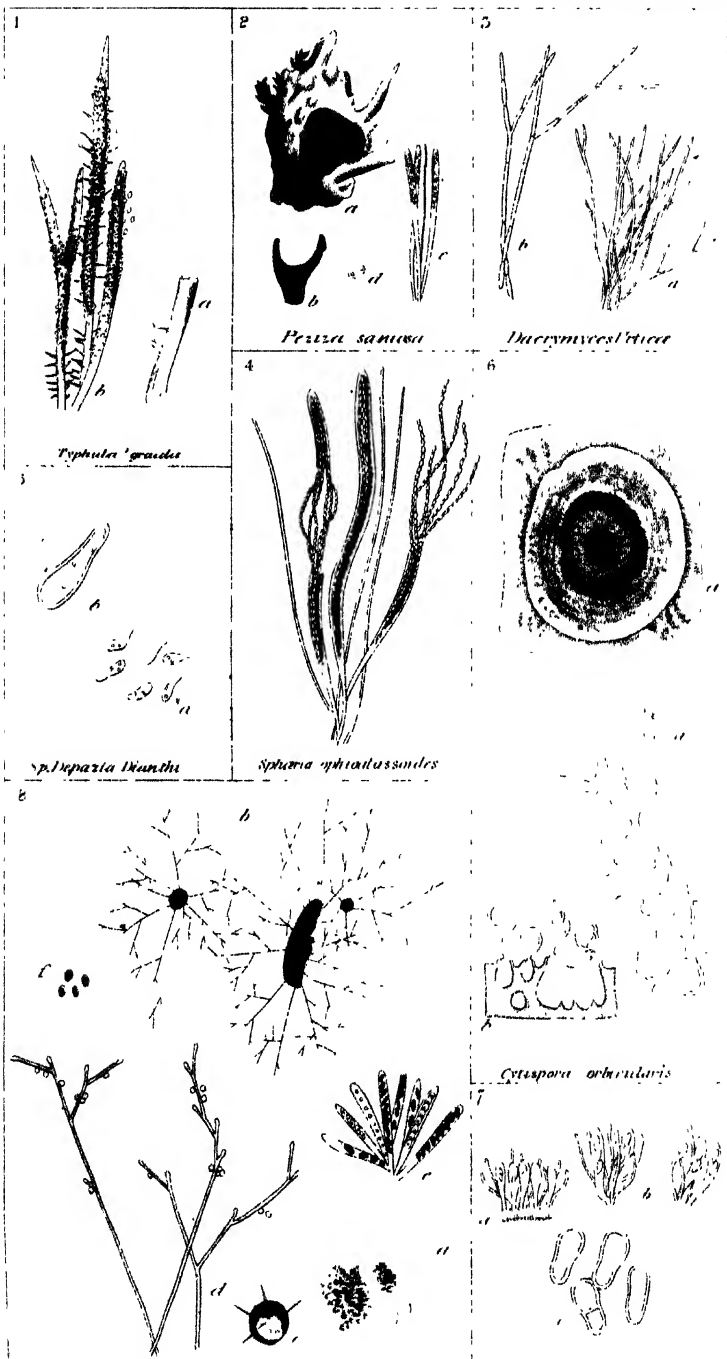
60. *Ag. decolorans*, Fr. Syst. Myc. v. i. p. 56. Woods, at King's Cliffe, Sept. 1, 1837. Distinguished from *A. alutaceus* by its pale sporidia, in consequence of which the gills remain much longer white, so that on an hasty inspection it might be passed over as a form of *Ag. furcatus*. The inside of the stem, which is thick and spongy, acquires in general a cinereous tinge. It is an esculent species clearly pointed out by Micheli, p. 155. n. 1.

*61. *Ag. grammopodius*, Bull. Inserted in the English Flora on the authority of Withering and Purton. I have found it in two fields at Apethorpe, Norths, sometimes forming large rings, where it appears every autumn. The description given in Eng. Fl. of *Ag. nebularis*, a species with which I was not at the time of its publication well acquainted, belongs to the present Agaric. The discovery of the true plant, which is figured by Dr. Greville under the name of *Ag. turgidus*, has cleared up all doubt upon the point.

62. *Ag. unguinosus*, Fr. Syst. Myc. v. i. p. 101. Amongst wet grass and moss close to the Spa, King's Cliffe, Oct. 18, 1837.

63 †. *Ag. calyptræformis*, n. s. *Ag. conicus*, *a. amœnus*,

† I have not thought it necessary to give figures of this or other new or little understood Agarics, as beautiful drawings have been made by Mr. J.





Vyp. tri-hum.

10



11

Isper. ill. n. ill.



Isper. curt.

Isper. curt.

Isper. curt.

Lasch in Linnæa, vol. iii. p. 380. This elegant species which occurred at the same time and place as the foregoing, is referred without doubt by Lasch to *Ag. conicus*. It does not however change to black when bruised or in decay, nor does it dry up, but becomes pallid and dissolves into a fœtid jelly. My specimens are of a beautiful rose colour, but according to Lasch, who, as far as I can discover, is the only author who has noticed it, it is also red and purple. The apex is often yellowish, and the whole gradually assumes an ochraceous tinge. It retains its colour, however, as observed by Lasch, when carefully dried. Pileus acutely conic, lobed below, about one inch high, three quarters broad at the base in unexpanded specimens, moist, striated, under a lens, with innate but raised fibrilla: rose-coloured gradually turning pallid; flesh rather thin. Gills rose-coloured, at length pallid like the pileus, very narrow and almost evanescent behind in many specimens, in consequence of the form of the pileus, though properly adnate, distinct. Stem one inch or more high, pure white except within the pileus where it has a slight roseate tinge, brittle, often spitting longitudinally, remarkably smooth, slightly striate, having in great measure the same transparent appearance as *Clavaria vermicularis*, hollow, the walls fibrous within. The young pileus has a great resemblance to the internal bractæ of an artichoke just before expansion.

61. *Ag. pudens*, Pers. Syn. p. 313. (sub *Ag. radicans*). *Ag. radicans*. *δ. pudens*, Fr. Syst. Myc. vol. i. p. 119; *Ag. longipes*, Bull. quoad tab. 232. This very elegant species is far less common than *Ag. radicans*. It has occurred two or three times in the present autumn in Rockingham Forest. The stem is quite as velvety as in *Ag. velutipes*, and the pileus, especially its margin, more or less so, and by no means glutinous. It appears to me quite distinct from *Ag. radicans*, as Persoon

D. C. Sowerby for the forthcoming new edition of English Fungi. It is his intention to publish it systematically, so that should it not meet with sufficient encouragement to secure its completion, each portion will be complete as far as it goes. The first volume, for instance, will comprise the genus *Agaricus*, for which figures of the greater number of British species are already prepared. The plates of the old edition will be used as far as may be thought expedient, but all errors will be as far as possible corrected, and many additions made. New plates will not in general be given of such species as are figured in the Scottish Cryptogamic Flora.

suspected, who well distinguished it; and intermediate between it and *Ag. velutipes*.

65. *Ag. erythropus*, Pers. Syn. p. 367. Abundant at Laxton, Norths, upon various substances, as wood, roots of grass, seedling chestnuts, &c. I have also found it at Nash Court, near Margate, and at King's Cliffe.

*66. *Ag. Vaillantii*, Fr. Syst. Myc. v. i. p. 136. On grass, &c., Ashton, Norths, Sept. 1837.

*67. *Ag. conchatus*, Bull., t. 298. On stumps of ash, Apethorpe, Norths, infested with *Sphæria aurantia*.

68. *Ag. cyanus*, Pers. Syn. p. 276.; *Ag. cærulescens*, Schæff., t. 34. f. 5. This is considered by Fries, to whom it appears known only by Persoon's character, as a state probably of *Ag. callochrous*, to which indeed it is allied, but, I think, quite distinct, and certainly one of the most beautiful species with which I am acquainted. I have seen it in one locality only at King's Cliffe, Sept. and Oct. 1837. Pileus two and a half to three inches broad, at length nearly plane with the margin repand, of a beautiful azure blue; at first viscid, when dry marked with a few innate indistinct squamiform patches, fleshy, flesh rather firm, not changing to violet when bruised. Gills rather distant, adnate, subdecurrent, obscurely emarginate, violet, at length stained with the sporidia. Stem three inches high, half to three quarters inch thick, solid, bulbous of the same colour as the pileus, fibrillose. Smell like that of radishes.

69. *Ag. bolaris*, Pers. Syn. p. 291. In beech woods, King's Cliffe, Sept. and Oct. 1837.

70. *Ag. reticulatus*, Pers. Ic. and. Descr. t. 4. f. 4. 6. On rotten stumps, Apethorpe and Laxton, Norths, Sept. and Oct. 1837. This species, which is one of considerable interest from its exact analogy with *Ag. phlebophorus*, Ditm., varies so much in passing to maturity, that till I found the fully expanded plant at Laxton, I was in great uncertainty whether it were the plant intended by Persoon. In the younger state the pileus is of a delicate bistre, and it is only in age that it assumes a violet tinge, apparently from the colour of the spores being partly seen through the flesh.

71. *Ag. trechisporus*, n. s. Amongst fern leaves, &c., King's

Cliffe, Aug. 1837. Pileus one inch broad, convex, strongly umbonate, margin thin; viscid but soon dry and satiny; umbo tawny, margin paler with a slight livid tinge. Gills ventricose, emarginate, scarcely adnate, pinkish-grey; extreme margin white, denticulate. Spores bistre-brown, subreniform, covered with granules, which appear sometimes to be arranged regularly in lines. Transparent, ventricose; pedicellate processes like those of the *Coprini* are scattered over them. These are crowned with a globule, which at length vanishes, and they are then denticulate. Stem two inches high, two lines thick, white, slightly striate under a lens and farinulent, nearly equal, except at the base, the outer coat of which is cottony, and has very much the appearance of an obsolete volva. I have not seen this species in an early stage of growth, and cannot therefore say distinctly what the nature of the volvæ-form base is, or whether it is merely accidental. The great peculiarity of the species consists in the granulated sporidia, a structure I have seen in no other Agaric. It appears to belong to the division *Inocybe*.

72. *Ag. centunculus*, Fr., Syst. Myc. vol. i. p. 262. On stumps, Apethorpe, Oct. 1837.

73. *Ag. depluens*, Batsch, Cont. i. f. 122. On the ground on the margin of a damp marshy spot amongst dead leaves of Carices. King's Cliffe, Norths, Oct. 1837. *Ag. rubidus*, Berk., Mag. Bot. and Zool., is a pedunculate form of this species.

*74. *Cantharellus lutescens*, Fr., Syst. Myc. vol. i. p. 320. King's Cliffe, Sept. and Oct. 1837. It is to be observed that Ditmar's synonym has by some accident in transcribing been recorded in Eng. Fl. under the present species. It is clearly *C. tubæformis* which is represented by him.

*75. *Cantharellus undulatus*, Fr., Syst. Myc. vol. i. p. 320. *Helvella floriformis*, Sow., t. 75. This rare species was found by the Rev. H. Margetts in the present month (Oct.) at King's Cliffe.

76. *Cantharellus fissilis*, Fr., Syst. Myc. vol. i. p. 324. *Peziza membranacea*, A. and S. p. 316. tab. 1. fig. 5. Montagne in a late number of the Annales des Sc. Nat. very properly unites *Peziza Campanula* and *Pez. Capula*, which he compares

with the genus *Cyphella*. I am inclined to think that both may be considered as synonymous with the present species. At least there is a very strong resemblance. The particular specimens I have now in view, which in the same spot varied from white and yellow to grey, are clearly *Cantharellus fissilis*, Fr. The hymenium of perfect individuals is that of a *Cantharellus*, while the younger plants would certainly be referred partly to *Peziza Campanula*, partly to *Peziza Capula*. On ash petioles, Apethorpe. I have found it also of a pure white with a remarkable venous hymenium on a dead thistle.

77. *Merulius tremellosus*, Schrad., Fr. Syst. Myc. vol. i. p. 327. On an ash stump abundantly, Apethorpe, Oct. 1837. I think that *Boletus arboreus*, Sow., t. 346. belongs to this species, though referred after Fries in Eng. Fl. to *Mer. lachrymans*. It appears that Sowerby had no doubt that the two plants figured by him were distinct, and it may be inferred from the short printed notice which accompanies the plate, that his plant had the border reflected, as indeed the figure shows, though not quite satisfactorily.

*78. *Polyporus spumeus*, Fr., Syst. Myc. vol. i. p. 358. On ash and apple trees, Apethorpe, King's Cliffe.

79. *Boletus felleus*, Bull., t. 379. King's Cliffe, Aug. 1837.

80. *Thelephora lœvis*, Pers. Syn. p. 575. Common upon fallen trees.

81. *Thelephora lactea*, Fr., Syst. Myc. v. i. p. 452. Easily known by its smooth white hymenium, covering a stratum consisting of thick fibrillæ. I do not think with Fries that *Fibrillaria stellata*, Sow. t. 387. fig. 1. belongs to this species. It appears rather to be an himantioid mycelium.

*82. *Clavaria pistillaris*, Linn. Succ. n. 1266. This rare species occurred at King's Cliffe in the present autumn, but a much paler form than that represented by Sowerby.

83. *Clavaria flavipes*, Pers., Comm. (ed. 1797) p. 207. t. 1. fig. 4. On peaty ground beneath *Pteris aquilina*, King's Cliffe, Sept. 1837.

84. *Typhula? gracilis*, Desm. and Berk. in Herb. This curious little plant, which occurred, but sparingly, in the early part of the present year with *Pistillaria culmigena*, I found marked in M. Desmazières' Herbarium *Typhula? Typha*, for

which by mutual consent the name of *gracilis* was substituted. Its real place is rather doubtful, as in some measure it connects *Typhula* with *Isaria*. The structure was not however precisely the same in all the individuals, for though in some of them the fruit-bearing cells of the hymenium were interspersed with delicate bristles, which were surmounted by a single spore, as in *Isaria intricata* and *citrina*, this is not constant, and I am therefore inclined to think that it arises from some of the cells being elongated. Pallid, one line or a little more high, simple or forked; rugged with the fruit-bearing cells, which are frosted with the spores, and interspersed sometimes with short bristles, of which some of the upper ones support a small spore: tips often acuminate and then nearly barren. Stem short, smooth, or bristly. Spores elliptic, having a sparkling appearance under a lens.

PLATE VII. fig. 1. *a*, *Typhula* ? *gracilis*, nat. size; *b*, ditto magnified.

85. *Pistillaria culmigena*, Mont. and Fr., Ann. de Sc. Nat. n. s. vol. v. p. 337. t. 12. fig. 2. Berk. Brit. Fung. Fasc. 3. n. 152. Fotheringhay, Deene, Norths, on sheaths of wheat straw, Jan. 1837.

*86. *Helvella elastica*, Bull., t. 242. It has long been remarked that some states of this plant resemble so closely *Peziza macropus*, as to make it matter of great difficulty whether or no to consider it as a distinct species. Fries dismisses the question with the remark, "video sæpe meliora proboq.—sed quis omnes præsumtas opiniones pessundare audet?" His views are confirmed by the circumstance, which appears not to have been observed heretofore, that the sporidia are precisely the same, as I have ascertained both in the white and dusky forms. I the rather call attention to the fact, as Dr. Greville's analysis of *H. crispa* and *lacunosa* might lead to a contrary notion. He has by some mischance represented only the sporidiola in those species and not the elliptic sporidia. It is possible that in his specimens they may have been absorbed, a circumstance by no means uncommon in Fungi, a fact to which I have been led, as to many others of great importance, by M. Morren's paper on the *Clostéries*, a

memoir which ought to be well studied by every investigator of the more obscure phænomena of Cryptogamic plants*.

87. *Peziza saniosa*, Schrad., Journ. Bot. 1799, ii. p. 64. Two specimens of this very curious species, which appears not to have been found since the date given above, occurred at King's Cliffe early in the present autumn, upon soil overrun with *Thelephora incrustans*. As it is of such rare occurrence I have thought it right to give a figure.

PLATE VII. fig. 2. *a*, *Peziza saniosa*, nat. size; *b*, vertical section; *c*, asci with their paraphyses and sporidia magnified; *d*, a single sporidium highly magnified.

88. *Peziza melaloma*, A. and S. p. 336. t. 2. f. 5. Southwick, Norths, abundantly on ground where a fire had been made, after the first autumn rains.

*89. *Peziza rhabarbarina*, Berk., Eng. Fl. vol. v. part 2. p. 197. This is clearly the same with Montagne's *Pez. Ardenensis*, Ann. de Sc. Nat. n. s. vol. v. p. 287. If it be retained in the genus *Peziza* the former specific name must be preserved. But there is reason to believe that M. Desmazières, who finds it in the north of France, is correct in referring it to the genus *Patellaria*. He proposes in this case to give it the specific name of *Rosacearum*. The sporidia are longer than Montagne figures them. He is correct in representing paraphyses, though he does not seem to have ascertained their form, which is linear with spatulate tips.

*90. *Dacrymyces Urticæ*, Fr. Syst. Myc. v. 2. p. 251. *Fusarium Tremelloides*, Grev. Sc. Cryp. Fl. t. 10. Eng. Fl. vol. v. part 2. p. 355. The structure of this fungus is not to be ascertained clearly without high magnifying powers. On a slight inspection with rather low powers the structure somewhat resembles that represented by Dr. Greville, but a close inspection will show that the mass consists not of long fusiform sporidia but of erect branched subdichotomous threads, which consist of articulations not to be seen without a very nice adjustment. The structure is very nearly that of *Dacrymyces stillatus*, nor does it differ sufficiently to warrant the

* Prof. Meyen's remarks, with abstracts of this curious paper, will be found in Meyen's Report of the Progress of Vegetable Physiology, in the year 1836. Philosophical Magazine, vol. xi. p. 386.

formation of a distinct genus. The specimens in my copy of *Scleromyc. Suecicæ* do not belong to this species but to *Peziza fusarioides*. I have examined repeatedly specimens from various localities and find all to agree with the accompanying figure.

PLATE VII. fig. 3. *a*, Group of filaments of *Dacrymyces Urticæ*; *b*, filaments magnified 600 diameters.

91. *Sclerotium neglectum*, Berk. Brit. Fung. Fasc. 3. n. 165. On dead leaves of various trees, as poplar, sycamore, oak, &c. Winter. Very common. More or less oblong, subadnate, at first covered with the cuticle, pallid; at length naked and dark-brown. Nearly allied to *S. inclusum*, Schm. and Kz. n. 137; but besides being almost adnate and seated in general upon the main nerves, it is far less wrinkled when dry, and pale when young.

*92. *Sphæria ophioglossoides*, Ehr. Beautiful specimens of this very rare species occurred at King's Cliffe, September and October, 1837. The observations upon the curious structure of the parts of fructification in this and the allied species given in Eng. Fl. have been fully confirmed by the examination of the recent plant. The asci are very long, accompanied by extremely slender paraphyses, and contain about six rows of minute oblong sporidia, which remain attached to each other after they have escaped, presenting when the asci burst the appearance of the threads of a *Schizonema*.

PLATE VII. fig. 1. Asci of *S. ophioglossoides*, with their paraphyses and sporidia magnified 600 diameters.

93. *Sphæria pedunculata*, Dicks. Sow. t. 437. Berk. Brit. Fung. Fasc. 3. n. 168. For observations upon this most interesting plant I refer to the Magazine of Zoology and Botany, vol. ii. p. 223.

94. *Sphæria hippotrichioides*, Sow. t. 200. *Thamnomycetes hippotrichioides*, Ehr. Hor. Phys. Ber. p. 82. Berk. Eng. Fl. l. c. p. 284. In the month of April I found some old matting covered with this fungus, in its infant state, in the church at Apethorpe. Having kept it in a cellar till the present month (October), it has perfected its perithecia, and given me an opportunity of ascertaining that it is a true *Sphæria*, with perfect asci. I had before suspected such to be the case from the

observation of one of the forms assumed by *Sphæria pedunculata*, Dicks., in which the receptacle is quite thread-like, and the perithecia naked. This resemblance became still stronger when the sporidia were submitted to the microscope, being furnished with a groove on one side exactly as in that species. I did not observe, however, that they had any gelatinous coat. It is probable that *Sphæria filiformis* will be found to resemble it in structure.

95. *Sphæria riccioidea*, Bolt. Brit. Fung. tab. 182. *S. parmelioides*, Mont. in Ann. de Sc. Nat. v. 6. p. 333. tab. 18. fig. 4. This species, though figured both by Tode and Bolton, has been entirely neglected by authors till its recent discovery by Dr. Montagne. He has, however, overlooked Bolton's synonym, whose figure and description, as far as they go, are with the exception of the cross section tolerably correct, and consequently has given it a new name, which must of course give place to that originally imposed by Bolton, Tode having published his plant under a different genus.

96. *Sphæria populina*, Pers. var. on ash. The asci and sporidia of this species are figured in the Magazine of Zoology and Botany, v. ii. t. 7. f. a. b. c.

97. *Sphæria sinopica*, Fr. El. 2. p. 81. On shoots of ivy, King's Cliffe. My specimens when young are frosted with a yellowish meal. In other respects they appear to be what Fries describes. Having found it abundantly I shall be able to publish specimens in the fourth fasciculus of British Fungi. In some points it resembles *Sp. Lamyi*, Desm., but the asci are linear. Sporidia elliptic uniseptate, each articulation sometimes containing a single sporidiolum.

98. *Sphæria acervata*, Fr. Syst. Myc. v. 2. p. 416. Berk. Brit. Fung. Fasc. 3. n. 174. On a dead apple-tree. Apethorpe, Norths.

99. *Sphæria pardalota*, Mont. Ann. d. Sc. Nat. n. s. v. 1. p. 304. tab. 12. fig. 1. Berk., Brit. Fung. Fasc. 3. n. 175. On dead stems of *Convallaria multiflora*. Milton, Norths. Communicated by Mr. J. Henderson.

100. *Sphæria obducens*, Schum. b. minor. Fr., Scler. Suec. ed. nov. n. 119. Berk. Brit. Fung. Fasc. 3. n. 177. On pales. Apethorpe, Norths.

101. *Sphæria Avellanæ*, Schm. Myc. Heft. 1. p. 64; Berk. l. c. n. 182. On dead hazel leaves. King's Cliffe. A true *Sphæria*. The specimens given in the British Fungi are young and have not perfected their asci.

102. *Sphæria Ostruthii*, Fr., Obs. 1. p. 174; Schm. and Kz. n. 205. On *Angelica sylvestris*. Bungay. Mr. D. Stock.

103. *S. (Depazea) graminicola*, Berk., Brit. Fung. Fasc. 3. n. 186. On leaves of the harsher grasses, as *Arundo Epigejos* and *Bromus pinnatus*. Apethorpe, &c. Spots oblong, pallid, surrounded by a more or less distinct darker line; perithecia obscurely disposed in lines immersed.

*104. *S. (Depazea) Dianthi*, A. and S. p. 47. t. 6. fig. 2. On *Agrostemma Githago*. Tansor, Norths. Sporidia† spatulate, sometimes divided into two parts, as the spores of *Dactylium pyriferum*, Fr., containing a few globose granules. Perithecia irregular conglomerate.

PLATE VII. fig. 5. *a*, sporidia magnified; *b*, a single sporidium magnified 600 diameters.

105. *S. (Depazea) vagans*, Fr., Syst. Myc. v. 2. p. 532. i. *Lamiicola*, Berk. Brit. Fung. Fasc. 3. n. 188. On *Lamium album*. Oundle, Norths, where I also at the same time met with the form which grows on the common mallow.

106. *Cytispora orbicularis*, n. s. Forming orbicular patches upon small orange gourds. King's Cliffe. Perithecia extremely thin, if indeed there be any wall distinct from the cellular substance of the matrix, more or less ovate when distinct, but in general confluent, with one or two orifices to each group. Sporidia very minute, oblong, pale vinous red, discharged in the form of slender tendrils. In a vertical section there is an appearance of distinct perithecia, but in the horizontal section this is scarcely observable. I am satisfied, however, that in any case it is much better referred to *Cytispora* than *Næmaspora*.

PLATE VII. fig. 6. *a*, *Cyt. orbicularis*, nat. size; *b*, vertical section; *c*, horizontal section; *d*, sporidia, all highly magnified.

† The bodies of which the tendrils are composed are very variable, a circumstance which induces me to call them sporidia rather than asci. Fries's rule is well worth attending to, that "sporidia either arise from conidia or are separated from flocci or asci. The form of the former is variable, of the latter constant."

107. *Labrella Ptarmicæ*, Desm. ! n. 189. Fr. El. 2. p. 149. In the early part of the present year I brought from M. Desmazières' garden at Lambersart, near Lille, a root of the double variety of *Achillea Ptarmica*, which is there always infested with *Labrella Ptarmicæ*. When the young shoots appeared a few leaves were attacked, and on examining the parasite I was surprised to find that, contrary to the generic character given by Fries, there are distinct asci and paraphyses. Asci short, obtuse, broad above, attenuated below. Sporidia few, obovate-oblong, sometimes rather contracted in the centre, and there occasionally furnished with a septum. Paraphyses short, flexuous, their tips obtuse or slightly clavate. Perithecium passing beneath the hymenium of a reticulated cellular structure.

PLATE VII. fig. 7. *a*, a small portion of the hymenium; *b*, asci, with their sporidia and paraphyses; *c*, sporidia magnified 600 diameters.

[To be continued.]

XXI.—On a New Species of *Epilobium* nearly allied to *Epilobium angustissimum* and *rosmarinifolium*. By W. H. WHITE.*

IN 1830 a collection of seeds was sent from the Botanical Garden of St. Petersburg, by Dr. Fischer, to the Botanical Garden of Louvain. The greater part of them were from Central Russia. Among the number of packages was one of an *Epilobium*, without any specific name, and with the indication *new species*.

The following particulars have been transmitted to me by M. Denkelaar, chief gardener at the Botanical Garden, Louvain, relative to the culture of this new species of *Epilobium*; and, as it contains some interesting remarks, I thought I could not make better use of them than by laying them before this Society.

This plant has been cultivated with the greatest care; and from a minute observance of its developments, and researches made into its characters, the cultivators have become convinced that up to the present time, this species has neither been described nor cultivated elsewhere. In order therefore to give a faithful exposition of its characters, and to make it better known to the botanical world, the

* Read before the Botanical Society of London, March 2, 1838, and communicated by the Secretary of that Society.

following specific denomination has been given to it, in accordance with the principles of the *angustissimum* and *rosmarinifolium*.

“ Our plant has a straight stem, much branched, branches diffused and silky, furnished with leaves alternate, lanceolate, acuminate, and of a silky whiteness. Its flowers, disposed in loose ears, are at considerable distances, solitary, and of a pale rose colour; stigma quadrifid and rather bent; the pod of the same length as the peduncle.

“ This description sufficiently indicates that the species in question belongs to a generic group designated by Decandolle, in his Prodrôme, by the name of *Chamaerion*, consequently to the same series in which is placed the *Epilobium angustissimum*.”—Curtis.

This last species, confounded by all authors with *Epilobium rosmarinifolium*, Haenke, (not Pursch,) until the publication of the Flora of Reichenbach, is in fact very different, as a long series of observations has proved, so that the above named publication has become comparatively useless by the publication of the Flora Excursoria.

However this may be, I take the liberty of stating that Reichenbach has not shown the essential differences between these two species of plants.

The one, in fact the *Epilobium angustissimum*, so beautifully figured in Curtis's Bot. Mag., Pl. 76, has its ascendant stem diffuse, branched, reddish, as well as its branches; its leaves linear-lanceolate, obtuse, very smooth, marked with glandular serratures; the flowers loose, solitary upon their footstalks, and flesh-coloured; stigma quadrifid and bent; the pod twice as long as the footstalk. It flowers long before the following, and grows spontaneously in Bavaria, Ireland, and Scotland.

The other, the *Epilobium rosmarinifolium*, Haenke, is a plant from Bohemia and the Tyrol, and has, on the contrary, an erect stem, diffuse, very much branched; branches spread; leaves lanceolate and acuminate, nearly entire, very slightly pubescent; a long ear, flowers more compact and of a puce colour; the stigma is of the same length as the footstalk, but the pod is four times that length.

In comparing the characters of the *Epilobium angustissimum* and *rosmarinifolium* with those of the *Epilobium* now described, the result is that the latter ought accordingly to be placed as intermediate between the other two, or at least as allied to both species. I propose to name it *canescens*, which will give a suitable idea of its habit. In recapitulating the characteristic traits of the three above-

mentioned species, I think their mutual affinities and their diagnostic characters will be fully determined as follows :

1. *Epilobium canescens*, nob. Foliis lanceolatis, acuminatis, integerrimis; ramisque sericeo canescentibus; siliquâ pedunculi longitudine.
2. *Epilobium angustissimum*, Curtis. Foliis lanceolato-linearibus, obtusis, glanduloso-serratis; ramisque glaberrimis, siliquâ pedunculo duplo longiori.
3. *Epilobium rosmarinifolium*, Haenke. Foliis lanceolatis, acuminatis, subintegerrimis, ramisque puberulis; siliquâ pedunculo quadruplo longiori.

I will now beg leave to remark with respect to the *Epilobium angustissimum* of Curt., that that species furnishes a variety with leaves still more narrow and stem feeble, which has been designated by the name of *Epilobium Dodonæi* by Allioni, of *Epilobium Lobelii* by Villars, of *E. Halleri* by Retz; and in later periods by *E. angustissimum*, β *alpinum* by Sering.

And with respect to the *E. rosmarinifolium*, Haenke, I beg leave to remark that it is a species totally distinct from his homonym, the *E. rosmarinifolium*, Pursch. This last is in fact a North American plant, discovered in 1810 in the environs of Philadelphia, and since by Bigelow, who calls it *E. lineare*; some few years still later in a hundred places south-west of that city, in the territory of Boston. Nuttall has found it, and has given it the name of *E. squamatum*.

XXII.—*Floræ Insularum Novæ Zelandiæ Precursor; or a Specimen of the Botany of the Islands of New Zealand.* By ALLAN CUNNINGHAM, Esq.

[Continued from p. 378 of vol. ii. of Sir W. J. Hooker's Companion to the Botanical Magazine.]

EXOGENÆ SEU DICOTYLEDONES.

PIPERACEÆ, Rich.

1. PIPER, L.

323. *P. excelsum*. Forst. Prodr. n. 20. Ræm. & Sch. Syst. Veg. i. p. 313. A. Rich. Fl. Nov. Zel. p. 356.—*Kana-Kana* of the natives.

New Zealand (Middle Island).—1773, Forster. (Northern Island,) a strong rambling shrub, frequent on the margins of forests.—1834, R. Cunningham.

2. *PLEUROMIA*, Ruiz & Pav., Kunth.

324. *P. Urnilleana*, foliis ovati-oblongis obtusis, basi attenuatis subtriner-viis membranaceis glabris, spicis lateralibus rectis filiformibus (solitariis), caule filiformi erectiusculo subsarmentoso. *A. Rich. Fl. Nov. Zel.* p. 356.

New Zealand (Middle Island), shores of Tasman's Bay.—1827, *D'Urville*. (Northern Island), upon shady rocks on the sea-shore, &c.—1834, *R. Cunningham*.

CONIFERÆ, Juss.

3. *DAMMARA*, Rumph., Lamb.

325. *D. australis*, foliis alternis oppositisve lineari-oblongis ellipticisve enerviis rigidis strobilis turbinatis, squamis apice patulis acutis. *Don. in Lamb. Pin. ed. 2. App.*—*Agathis australis*. *Salisb. in Linn. Tr.* vol. viii. p. 312. *Loud. Encycl. Pl.* p. 802.—*Podocarpus? zamiaefolius*. *A. Rich. Fl. Nov. Zel.* p. 360.—*Kauri* or *Kouri* of the natives.

New Zealand (Northern Island). *Cook, Forster*. In forests at the river Thames, at Mercury Bay and along the coasts north of the Bay of Islands and Wangaroa on the eastern side, and Hokianga on the western coast.—1826, *A. Cunningham*.—1834, *R. Cunningham*. It is said not to exist on the Middle Island.

The most important among the timbers of these islands, inhabiting dark forests, as well on the coasts as remote from the sea-shore, where it is to be observed from 50 to 100 feet high; the trunk, at the base of such, varying from six to twelve feet in diameter. The timber is of excellent quality, close-grained, durable, and applicable to a variety of purposes, in house carpentry, as well as in plank or spar for naval uses. As yards and topmasts for ships, it has been found, by repeated trials, superior to all others, both as regards strength and flexibility. The tree yields a large quantity of a white and amber-coloured resin, which burns with a bright flame, diffusing an agreeable smell. This resin is called by the natives "*Tare*," and is used by them as a masticatory. It is also burnt for the soot, which the smoke deposits in abundance, and from which pigment, called by these people *Ngarahu*, is obtained the colouring substance employed by them in the operation of tattooing their persons.

4. *PHYLLOCLADUS*, R. Br., Rich. Conif. p. 129.

326. *P.* trichomanoides*, frondibus pinnatis, foliolis cuneatis inciso-lobatis, lobis truncatis dentatis. *Don. in Lamb. Pin. edit. 2. App.* *Rich. Conif.*

* Species altera hujus generis est :

P. rhomboidalis, frondibus rhomboideis lineatis inciso-serratis, inferioribus connatis decurrentibus. *Don. in Lamb. Pin. ed. 2. App.* *Rich. Conif.* p. 129. f. 3.—*Podocarpus asplenifolius*. *Labill. Nov. Holl.* 2. p. 71. t. 221. *Parsley-leaved* or *Adventure-Bay Pine*, *Colonia*.

Hab. In Insula Van Diemen, ad Adventure Bay, &c.—1793, *J. J. Labillardière*.—1819, *A. Cunningham*.

p. 129. t. 3.—*P. rhomboidalis*. *A. Rich. Fl. Nov. Zel.* p. 363. non *E. L. Rich., Br. et excl. syn. Labill.*—*Tanekaha* of the natives, *Rev. W. Yate*. “*Ton-toa* ab incolis vulgo dicitur,” *D’Urville*.

New Zealand (Northern Island), forests on the banks of the river Thames, and in dry woods on hills at the Bay of Islands, Wangaroa, &c.—1826, *A. Cunningham*.

A tree of straight tapering growth, occasionally attaining the height of sixty feet, seldom, however, exceeding a diameter of three feet. The wood is a shade darker than the *Dammara* or *Kauri*; it has a closer grain, smells strongly of turpentine, and being less affected with wet than any other pine, is regarded as an exceedingly valuable wood. “It is used,” says the *Rev. W. Yate*, “for all kinds of outside work, such as posts and floors for verandahs, and is much sought after for the decks of vessels.” Its bark is used by the natives for dying a red colour, which they prepare in the following way: “The bark,” says *Bennett*, “is pounded and then placed in a vessel of cold water, into which hot stones are thrown till the water boils, this being the natives’ mode of treating water, since, having no knowledge of pottery, they possess no vessel which can be placed on the fire. After the bark has been boiled for some hours, the decoction becomes of a dark red colour; it is then left to cool, when it is strained and ready for use.”

5. *PODOCARPUS, L’Hérit.*

327. *P. ferruginea*, foliis pectinatis lineari-lanceolatis acuminatis falcatis. *Don. in Lamb. Pin. ed. 2. App.*—*Miro* or *Mairi* of the natives.

New Zealand (Northern Island), in forests near the Keri-Keri, and in the country between that river and the Hokianga, &c.—1834, *R. Cunningham*. Occasionally to be observed on hilly ground.—1792, *Gouv. Phillip*.

“A tree,” says the *Rev. W. Yate*, “growing from forty to sixty feet high, but never arriving at a larger circumference than twelve feet. It produces a brittle, close-grained, durable wood, of a red colour, planes up smoothly, and appears capable of receiving a high polish. It is, however, too brittle for the cabinet-maker, or it would not be a bad substitute for mahogany. The fruit, which is devoured by the large wood-pigeon, is of the colour of the yew berry, but larger, and with a strong taste of turpentine.”

328. *P.?* *Totarra*, foliis undique versis lineari-lanceolatis mucronatis subtus glaucis. *Don. in Lamb. Pin. ed. 2. App.*—*Dacrydium taxifolium*. *Sol. MSS. Lamb. Pinn.* p. 137.—*Totarra* of the natives.

New Zealand (Northern Island).—1769, *Sir Jos. Banks*.—1792, *Phillip*.—1826, *A. Cunningham*. Banks of the Kahio, Wangaroa, &c.—1834, *R. Cunningham*. (Middle Island,) of large size, like *Dammara* or *Kauri*.—1791, *A. Menzies*.

This pine is regarded with great esteem by the New Zealanders while growing, and when it has acquired a sufficient magnitude, is felled to construct canoes; its lightness, toughness, and durability giving it a higher value than even the *Kauri* itself. The *Totarra* is a red pine of stately erect growth, twenty to sixty feet high to the branches, and hence producing excellent spars. The value placed by the natives on this pine, the trunk of which varies in circumference from six to eighteen feet, is sometimes the occasion of quarrels sufficiently serious to terminate in bloodshed, if it be cut down by any one except the party by whom it is claimed; for which reason a mark is placed on the trunk that it may be known to whom it belongs. The tree is then sufficient to stand till it has acquired a suitable bulk for use, so that it is not unusual for a *Totarra* to descend from the father to the son.

6. DACRYDIUM, Soland. and Lamb., Rich. Conf.

329. *D. ? Mai*, foliis aversis linearibus obtusis apiculo subcalloso, marginibus revolutis, supra lævibus viridibus, subtus glaucis, ramulis adultioribus strictis, junioribus valde virgatis.—*Mai* or *Metai* of the natives.

New Zealand (Northern Island), in forests at some distance from the sea-coast, where it attains the height of eighty feet.—1826, *A. Cunningham*.—1834, *R. Cunningham*.

A red pine, as dark as cedar. The wood has been found durable, but being brittle it furnishes very indifferent spars.

330. *D. ? plumosum*, foliis (ramuli junioris) pectinatis linearibus mucronato-aristatis, adultioribus (parvis) compresso-triquetris distichis arcuatis imbricatis carinatis obtusis supra concavis, ramulis quum complanatis oppositis. *Don. in Lamb. Pin. ed. 2. App.*—*Kawa-ka* of the natives, *Rev. W. Yate*.

New Zealand (Northern Island), forests near the Bay of Islands, &c.—1829, *G. Bennett*.—1834, *R. Cunningham*.

Mr. Yate informs us that it is a tree growing about thirty feet high with a diameter of one to three feet. The wood is beautifully grained, close and heavy, and would make beautiful picture frames if they were required of a deep stain. It is, however, not much known, and has never as yet been sought after to be applied to any useful purposes.—*Yate's New Zealand*, p. 45.

331. *D. excelsum*, foliis laxè imbricatis subulatis compresso-tetragonis mucronatis glaucis angulis depressis. *Don. in Lamb. Pin. ed. 2. App.*—*Podocarpus dacrydioides*. *A. Rich. Fl. Nov. Zel.* p. 358. t. 39.—*Kahi-Katea*, nom. vernac.

New Zealand (Northern Island), swampy grounds on the margins of rivers, viz. the Thames, Kana Kana, and Hokianga.—1826, *A. Cunningham*.

ham. (Middle Island), in marshy forests on the shores of Tasman's Bay.—1827, *D'Urville*.

A white pine of tall stately growth, exhibiting oftentimes a clear stem of eighty feet, and with its branched head attaining a height of 120 and 130 feet, the diameter of such trees exceeding five feet. Except for common canoes, in the construction of which it is employed by the natives on account of the great length of its trunk, its wood is seldom used, being of so soft and spongy a nature as to rot in a few months of exposure to the weather. It has been asserted that as for all the canoes made on Middle Island this timber is employed, so the *Dammara* or *Kauri* does not grow upon it. Certain it is, at least, that the latter noble tree has not been seen in its forests by voyagers.

332. *D. cupressinum* (Sol.), foliis linearibus subulatis tetragonis muticis viridibus angulis elevatis, junioribus divaricatis, adultioribus laxè imbricatis, ramulis flexuosis dependentibus. *Sol. MSS, Lamb. Pin.* p. 93. t. 41. *Rich. Conf.* p. 127. t. 2. *A. Rich. Fl. Nov. Zel.* p. 361.—Spruce tree of New Zealand. *Cook's 2nd Voyage*, i. p. 70. t. 51.—*Riun* or *Deum* of the natives.

New Zealand (Middle Island), Dusky Bay.—1773, *G. Forster*.—1791, *A. Menzies, Esq.* Astrolabe Harbour.—1827, *D'Urville*. (Northern Island).—1769, *Sir Jos. Banks*.—1826, *A. Cunningham*. Bay of Islands, &c.—1834, *R. Cunningham*.

This elegant tree, a red pine, attains its greatest perfection, as we learn from Mr. Yate, in shaded woods and in moist rich soils. Its topmost branches are not more than eighty feet from the ground, and the diameter of its trunk seldom exceeds four feet. The foliage, especially when the individual is young, is remarkably graceful and beautiful. Capt. Vancouver, who met with it in abundance in the forests of Dusky Bay, cut down several of these trees to refit his vessel, and found the timber solid and close-grained and very much resembling the Bermudas cedar. From the younger branches, which give out a bitter resinous juice, Capt. Cook on his second voyage to those islands prepared a kind of spruce beer, which he found excellent in scorbutic complaints, with which some of his seamen were affected.

URTICÆ, *Juss.*

1. *URTICA*, *L.*

333. *U. ferax*. *Willd. Sp. Pl.* 4. p. 352. *A. Rich. Fl. Nov. Zel.* p. 354. *Forst. Prodr.* n. 346.

New Zealand (Middle Island), Queen Charlotte's Sound, Cook's Strait.—1773, *G. Forster*.

334. *U. debilis*, caule herbaceo erectiusculo folisque alternis ovatis petiolatis integerrimis pilosiusculis, pedunculis axillaribus trifloris. *Endl. Prodr.*

Fl. Norf. p. 37.—*Parietaria debilis*. *Forst. Prodr.* n. 387. *Willd. Sp. Pl.* 4. p. 958. *A. Rich. Fl. Nov. Zel.* p. 354. *Jc. Ferd. Bauer.* t. 116. (Endl.)

New Zealand (Middle Island).—1773, *G. Forster*. (Northern Island), flooded banks of the Kana-Kana river, Bay of Islands.—1826, *A. Cunningham*.

2. *ELATOSTEMA*, *Forst. Char. Gen.* t. 53. *Endl.*

335. *E. ? rugosa*, caulescens, foliis sessilibus alternis ovato-oblongis acuminatis obliquis rugosis scabris versus basin angustatis grosse inaequaliterque serratis, basi auriculatis, capitulis axillaribus subsessilibus.—*Dorstenia rugosa*. *Banks and Sol. MSS. in Herb. Banks.*—*Paratanauwa* of the natives. *R. C.*

New Zealand (Northern Island).—1769, *Sir Jos. Banks*. Frequent in damp shady woods on the banks of rivers, the Kana-Kana, &c.—1826, *A. Cunningham*.—1834, *R. Cunningham*.

It appears closely allied to *E. pubescens*, *Forst.*, or *sessile* of the same author, a plant indigenous to the Society group; but that species is described as having axillary capitula on pedicles and leaves not wholly destitute of petioles.

3. *HEDYCARIA*, *Forst. Char. Gen.* 127. t. 61.

Flores dioici. *Mas* Perianth. monophyllum, plano-rostratum, 8—10-fidum, laciniis lanceolatis subaequalibus. *Stam.* *Antherae* plurimae (50) oblongae quadrisulcae, apice barbatae, per totum fundum perianthii sessiles. *Fem.* *Perianth.* ut in *Mas.* persistens. *Pistulum.* *Pedicelli* breves numerosi cylindrici, in medio perianthii elevantes. *Germina* globoso-depressa. *Styli* nulli. *Stigmata* papillae per germine sparsa. *Pericarpium* nuces (8 s 10) pedicellatae, globosae, subossae, monospermae. *Fructices* *Nove Zelandiae et Australasiae*. Folia opposita, petiolata, exstipulata, venosa, pellucido-punctata dentato-serrata, serraturis glanduloso-callosis. Racemi axillares.

336. *H. dentata* *, foliis ovatis obovatisve obtusiusculis remote denticulato-serratis ramulisque glabris, racemis axillaribus corymbosis tomentosis. *Forst. Prodr.* n. 349. *Willd. Sp. Pl.* 4. p. ? *A. Rich. Fl. Nov. Zel.* p. 351.

* In New South Wales two other species have been observed, which may be thus characterised, viz.

H. macrophylla; foliis ellipticis obtusiusculis breviter petiolatis remote serratis quandoque sub coriaceis rare integerrimis, utrinque glabris reticulato-venosis, venis prominulis, ramulis racemi axillaris cinereo-scabridis.

A large shrub, frequent in shaded woods on the coast, especially on the banks of the larger rivers of the colony.—1804, *R. Brown, Esq.*—1818, *Alan Cunningham*.

H. angustifolia, glaberrima, foliis lanceolatis ovato-lanceolatis attenuatis acutis discoloribus, a basi versus medium integerrimis, deinde ad apicem grosse serratis, racemis axillaribus simplicibus.

In ravines in the Blue Mountains.—1834, *R. Cunningham*.

—*Zanthoxylum* Novæ Zelandiæ. *A. Rich. Fl. Nov.* p. 291. t. 33.—Poroki-wiri of the Islanders. *R. Cunningham.*

New Zealand (Middle Island).—1773, *G. Forster.* (Northern Island), a tree twenty-five feet high, frequent on the banks of the Kana-Kana and other rivers at the Bay of Islands, Wangaioa, &c.—1826, *A. Cunningham.*—1834, *R. Cunningham.*

337. *H. scabra*, foliis elliptico-ovatis vel ovato-lanceolatis distanter serratis utrinque ramulisque scabris, corymbis axillaribus strigoso-pilosis. *Spreng.? conf. Steud. Nomencl. Bot.* p. 390.

New Zealand (Northern Island), a tree thirty feet high, Keri-Keri river, Bay of Islands.—1826, *Allan Cunningham.*

4. BROUSSONETIA, *Vent. tab.* 3. p. 567.

338. *B. papyrifera.* *Duham. Arb.* ii. xvi. t. 5. *Willd. Sp. Pl.* 4. p. 743. *Andr. Repos.* t. 480.—*Morus papyrifera.* *L. Forst. Prodr.* n. 347.

New Zealand, in the northern parts of the Northern Island.—1769, *Cook.*

After enumerating certain plants that he observed in cultivation among the New Zealanders, on his first visit in 1769, Capt. Cook adds, “ We also found the Chinese *Paper Mulberry Tree*, the same as that of which the inhabitants of the South Sea Islands make their cloth; but it was scarce, and only used to wear as an ornament in the holes which they make in their ears.”—*Cook's First Voyage*, iii. p. 443.

Obs. An verè indigena?

[To be continued.]

XXIII.—*Observations upon some recent Communications of Mr. J. E. Gray, of the British Museum, to the Annals of Natural History; with Descriptions of two New Kangaroos from Van Diemen's Land.* By W. OGILBY, Esq., M.A., F.R.A.S., F.L.S., F.G.S., F.Z.S., &c.

IN the first number of the *Annals of Natural History*, p. 27, Mr. Gray has given a notice of two skins of an animal originally described by the late Mr. Bennett, but which that gentleman refrained from naming, because from the imperfect nature of the materials at his disposal, he was not certain whether it was a *Zebra* or an *Antelope*. Mr. Bennett's own opinion originally was that the animal in question belonged to the genus *Equus*; but the researches which, as most zoologists know, I have myself prosecuted for the last six years on the subject of the *Ruminantia*, enabled me to arrive at a more just conclusion, and to determine both the characters and affinities of this beautiful quadruped. This result I communicated to Mr. Bennett, expressly stating to him my conviction that it was

closely allied to the Guib and Boshbok (*Antilope scripta* and *sylvatica*), and though he naturally placed less confidence in my induction than I did myself, it nevertheless occasioned him to modify his opinion, and to think, as he himself observes, (Proc. Com. Sci. Zool. Soc. ii. 123.) after expressly stating his reasons for believing it to be a species of Zebra, that "it might not improbably belong to some species of Antelope." Four years after Mr. Bennett's notice, viz. in Nov. 1836, having occasion to describe some new and rare Antelopes at a meeting of the Zoological Society, at which Mr. Gray was present and took part in the proceedings of the evening upon the subject of my communication, I took the opportunity of detailing at length my opinions with regard to the characters and relations of the animal in question, to which I gave the name of *Antilope Doria*, and announced its true habitat to be the western coast of Africa, and not Algoa Bay as supposed by Mr. Bennett. A short abstract of these observations will be found in the Zool. Proc. iv. 121.

I have been induced to detail this history of the *Antilope Doria* up to the period of Mr. Gray's notice, simply for the purpose of showing that whatever little merit can result from having pointed out the characters and affinities of this beautiful animal, and consequently the right of naming it, belong neither to Mr. Bennett nor Mr. Gray. The former gentleman was too just to claim such a right; the latter, though he has taken the liberty of exercising it, has still less pretensions; for not only has he added nothing new to the history and description of the animal, but his observations are even fewer and less important than those which I have long since published. That I have just cause of complaint I cannot help thinking, when I remember that Mr. Gray took part in the proceedings of the meeting when my observations were made and my name given; and that he must be well acquainted with the published account of those "Proceedings" containing both the name and the observations, having been officially engaged in their revision; and finally, that the original skin has been long exhibited, *with my name attached*, in the Museum of the Zoological Society, to which he is a frequent visitor, besides being a member of the Museum Committee. It was my intention to have noticed this subject in the last Number of the *Annals*, but I was prevented from doing so by a communication from Mr. Gray, of which the following is an extract: "He also takes the opportunity of informing Mr. Ogilby that it is his (intention?) to correct the error into which he has fallen with respect to the *Antilope Doria* in the next Number of the *Annals*." This promise Mr. Gray has not fulfilled; but instead of the promised correction the

second Number of the 'Annals' contains a favour of another and very different description on the part of Mr. Gray, which I shall now briefly notice.

On the 28th of last November I exhibited and described at the Zoological Society a new species of Phalanger, from the island of Van Diemen's Land, which I proposed to call *Phalangista Viverrina*, and which, I observed, was the species figured in Cook's Voyages, and hitherto confounded with the *Phalangista Cookii* of M. Geoffroy St. Hilaire. I stated moreover that I had been long acquainted with the characters of the animal, and its specific distinction from the real *Phalangista Cookii*, from a specimen in the British Museum, in which establishment it was confounded with that species, but that I refrained from noticing it, as well from a point of delicacy as because I was unacquainted with its precise habitat. Mr. Gray was present at the meeting in question, and took a very prominent part in the proceedings of the evening. With the exception of one or two mistakes, he has in the last Number of the Annals reproduced the observations which I made on that occasion almost word for word, appropriating them to himself, without any allusion to my communication, and proposing a new name of his own (*P. Banksii*), not for the new species, but for the old *Phalangista Cookii*, reserving the latter name most improperly for the new species, which had already been named by me *Viverrina*, avoiding the charge of suppressing my name. Mr. Gray's observations manifestly show that at the time they were written he was not aware that the Van Diemen's Land species was the animal so long possessed by the British Museum, as he regrets that no specimen was sent by Mr. Gunn, and I presume that he had either forgotten this part of my observations or refreshed his memory from the minute book of the Zoological Society, in which a very brief abstract only of them is given : yet I observe that he has since had the label "*Hepoona Cookii*, Van Diemen's Land," attached to the animal in the collection of the Museum, having, I suppose, become acquainted with the characters of the animal from the specimens of both species in the Museum of the Zoological Society. This is but a supposition on my part ; but it cannot be far from the truth, as the two species have been exhibited with my names in the Zoological Society's collection ever since the period of my observations, and Mr. Gray's paper plainly shows that he had no original knowledge of their specific distinction. Mr. Gray is at considerable pains to show that the Van Diemen's Land species, *which is the new one*, and to which I gave the name of *P. Viverrina*, should be called *P. Cookii*, and that *the old one which has always passed by that name*

hitherto, is that which should have a new name, and he accordingly proposes for it the name of *P. Banksii**. The cause of Mr. Gray's anxiety in this matter may perhaps easily be divined; but of this the reader will judge. The *P. Cookii* of all writers refers to the continental species, of which there are specimens at Paris, Leyden, Frankfurt, &c.; and Mr. Gray's attempt to transfer the name to the Van Diemen's Land species, merely because a plate in Cook's Voyage has been confounded with it, is as productive of confusion as it is disingenuous. His proposed generic name of *Hepoona* is equally unhappy; it is really the native name of a *Petaurist*, and not at all of a *Phalanger* as erroneously supposed by Mr. Gray: besides which, the group which he thus designates is one which I first pointed out and characterised in March 1836, under the name of *Pseudoechirus*. The wallaby kangaroo, which Mr. Gray has likewise renamed (*H. Tasmanii*), is the same species which I had previously described at the Zoological Society under the name of *Macropus rufiventer*, and of which I have here given a more detailed description.

I regret having been obliged to make these statements, and sincerely hope that Mr. Gray will spare me the trouble of doing so in future.

I have been much pleased with Mr. Gunn's communication, which contains much valuable information upon the mammals of Van Diemen's Land; and it is therefore with real satisfaction that I have it in my power to supply one of its very few deficiencies, by the following descriptions of two of the species of kangaroos there mentioned. (p. 105.)

Macropus (Halmaturus) fruticus, the Brush Kangaroo.—Head, back, croup, and outer surface of the arms and thighs clear russet brown, slightly grizzled with silvery grey, the fur being of a slaty brown colour at the root, and russet brown at the tip, long, copious and thick; the face from the eyes down, the lips and chin are deep uniform brown, as are likewise the paws both fore and hind, but the whole of the tarsus and hind legs are of a clear light grey colour,

* Mr. Gray is evidently wrong in this matter. He cannot take away the name of *P. Cookii* from the *animal* to give it to a *mere picture*, merely because the original describers made the mistake of referring to it. Cook discovered both species and figured one: the *unfigured* species has been long known and described under Cook's name; the *figured* species was first described by myself last November by the name of *P. Firerrina*: in proposing to change the names of both species Mr. Gray commits not only a private wrong with regard to me, but a great public injury both to science and the original describers of *P. Cookii*, by the confusion which he would introduce into the nomenclature.

and form in this respect a striking contrast to the sombre hue of the toes; the under surface of the tarsus is naked and callous; the belly and under parts of the body are very light hoary grey, the fur here being equally long and dense as above, and of the same deep slaty brown colour at base, but with a long and conspicuous hoary point; the tail of middling size, attenuated, dirty yellowish grey, with a small, brown, obscurely tufted tip, and very nearly naked beneath, the hair being worn short and bristly on the terminal half; the ears pretty large, rounded, with dirty white hair about the edges, within, densely covered with long soft hair without, grizzled at the base, but dark brown with a shade of russet on the terminal two thirds. The two front incisors larger than the lateral, separate at the base, converging at the point; the external lateral incisor twice the size of the middle one, and divided in the proportion of about 2 : 3 by a vertical duplicature on the outer face, giving the tooth at first sight the appearance of being double. The claw of the great hind toe is short, round, and blunt, as in *M. penicillatus*; and *M. fruticus* is the only kangaroo besides that species in which I have noticed this character. Length, 2 ft. 9 in.; tail, 1 ft. 10 in.; head, 5¼ in.; ear, 3 in.; tarsus to the origin of the great claw, 7¾ in.

Macropus (Halmaturus) rufiventer, the Wallabee of Van Diemen's Land.—This is a very different species from the Wallabee of New South Wales, (*M. Ulubatus*.) being smaller, and of a more reddish brown colour. It is considerably smaller than the last species (*M. fruticus*), but has similar incisors, except that the middle pair are not proportionally longer or larger than the lateral, and the duplicature of the external so small as to be apparent only on the posterior face, dividing the tooth in the proportion of about 1 : 3; this tooth is itself of smaller dimensions comparatively speaking than its analogue in *M. fruticus*. The general colour of *M. rufiventer* is greyish brown above, considerably darker than the wild rabbit, and deeply shaded on the back and croup with pure black hairs, which, in certain lights, give these parts a perfectly black shade; the paws and outer face of the fore legs are of the same colour; the tarsus and hind legs brown; the chin, throat, belly, and abdomen, sandy red, more or less intense in different specimens; ears yellowish red within, black or very dark brown on the outside; tail short, rather darker than the body above, dirty yellowish on the sides, naked and granulated for two thirds of its length on the under surface; claws long and pointed; nose naked; length of the body, 2 ft.; tail, 1 ft. 2 in.; head to root of ear, 4¼ in.; ear, 1¼ in.; tarsus to great claw, 5¼ in. First described before the Zoological Society, February

28th, 1838, under the name here given: afterwards by Mr. Gray under the name of *H. Tasmanii* (vide Ann. Nat. Hist. vol. i. p. 108. for April 1st, 1838). Mr. Gray's description of this animal is manifestly independent of mine, since his paper, though only published on the 1st of April, is dated February 10. My own knowledge, both of this species and *M. fruticus*, dates from November last, when I had an opportunity of becoming acquainted with them through the kindness of Mr. Gould: the question between us, therefore, on this point is merely one of precedence.*

XXIV.—Information respecting Botanical Travellers.

THE following interesting communication has been received from George Bentham, Esq., Secretary to the Horticultural Society, &c.

M. Theodor Kotschy, a botanical collector from Vienna, joined as botanist an expedition of Austrian geologists sent to search for useful fossils in the domain of the Viceroy of Egypt. With this expedition he touched at Greece in the year 1836, from thence went to Cairo, and after a very short stay in Syria, he spent two of the most favourable summer months of that year in the little-known chain of the Taurus. From this country he transmitted to Vienna a considerable collection of dried plants, containing many species entirely new, and many others only known by the collections of Tournefort and other older botanists, and only now to be found in a very few herbaria.

From Syria M. Kotschy proceeded in 1837 to Nubia and Abyssinia, and at the time the last news were received from him at Vienna, he was in the most southern parts of Cordofan and Darfour, between 10° and 11° N. lat., and was expecting, after the rainy season, to penetrate still further south. He represents the vegetation of these countries as in the highest degree remarkable and imposing. The expedition had already met with several troops of elephants and of giraffes, and Mr. Kotschy also mentions some stems of *Adansonia* of an enormous size. It is probable he may be mistaken as to the iden-

* Having intimated to Mr. Gray the subject of Mr. Ogilby's communication, we have received from him the following note, which he had intended to send us last month, but had mislaid.—EDIT.

Antelope Zebra. I find that Mr. Ogilby, in a notice of some other Antelopes, in the Proceedings of the Zoological Society for 1836, p. 121, had previously given the name of *Antelope Doria* to the skins of this animal noticed by Mr. Bennett; but as he gives no additional particulars, and as the name is only incidentally mentioned, and does not even occur in the index of the volume, I had overlooked it.—J. E. GRAY.

tity of these trees with the *Adansonia* of Senegal ; but it will not be the less interesting, should this be the case, to ascertain what vegetable giant in Western Africa represents the colossus of the East.

Some sets of M. Kotschy's Taurus and Syrian plants, consisting of from 230 to 260 species, most of them named, may still be had at the rate of about thirty shillings the hundred, besides the carriage from Vienna. The collections from Nubia are on their way to Vienna, and the price will only be fixed after their arrival there.

BIBLIOGRAPHICAL NOTICES.

A History of British Reptiles. By Thomas Bell, Professor of Zoology in King's College, London. Illustrated by a Wood Cut of each Species, with some of the varieties, and numerous Vignettes, No. I. 8vo. Van Voorst, London, 1838.

THIS is the first number of another portion of M. Van Voorst's series of works illustrating the British Fauna, and in its general character we think it one of the very best. The figures are well and *scientifically* drawn, and are beautifully cut. The descriptive part is also excellent, and enters at once into the difficult parts of the synonymy, and the distinctions between the species of our reptiles which are allied to each other, or to those of the continent. We have only one objection ; the work is a history of BRITISH REPTILES, but the range of the species out of England is scarcely touched on. This information, it is true, is difficult to be procured from actual observation, but there are surely persons in both the sister divisions of our islands who would have willingly communicated what they knew.

The number commences with the two turtles (*Chelonia imbricata* and *Sphargis coriacea*) which possess so slender a claim to a place in our Fauna. We would consider the instances where both species have been found within the range as entirely accidental. And it seems questionable even that either of them were wafted to our shores, from having mistaken their course, or from an extraordinary war of elements. The *Lacertidæ* follow next, and in the description of the first, the application of *Lacerta agilis*, Linn., to the proper animal seems clearly made out, and the fact of our possessing two species, members of distinct genera, established without a doubt. We are not aware that the *L. agilis*, Linn. and Bell, *L. Stirpium* of Jenyns, has yet been discovered in Scotland ; since the publication of the 'Manual' by the last-named naturalist we have been look-

ing anxiously for it, but in all the inland localities the little *Zootoca vivipara* only occurs. The latter species, which Mr. Bell remarks extends "even into Scotland," is most abundant, and ranges far to the north. We have seen it on the southern confines of Sutherland and Ross-shire, and from thence to the English border; it is common on all the subalpine heaths reaching to a considerable elevation. It is also frequent on the sandy downs of the coast where heath and bent-grass abound, and where the true *L. agilis* might be expected. We would remark of Mr. Bell's figure or cut of this pretty reptile, that the common Scotch variety is more distinctly marked than that which he has exhibited, the interior of the lateral dark markings being bordered by a yellowish white line, clearly conspicuous even when the creature is running. In a specimen of what appears to be this reptile, taken on the coast, the scales containing the femoral pores are larger than what is stated. They appear as large as those represented in the cut at page 21, but are *round* and *oval*, not of the triangular form seen in fig. *a*. The animal, we think, agrees in other parts with the characters given of *Z. vivipara*, and in the proportion of the toes and toothless palate.

The subject of the next figure and description, *Anguis fragilis*, is also common in the south of Scotland. We have found it most commonly in dry, stony, subalpine situations, where it easily finds a retreat on the appearance of danger.

A beautifully cut figure of the common snake follows, but as the description is just commenced, we leave it till the publication of the next number.

The Birds of Australia and the adjacent Islands. By John Gould, F.L.S. Part II. Folio. London, 1838.

We formerly (in the Mag. of Zool. and Bot. vol. ii. p. 357.) noticed the first and commencing number of this work, produced in the same style of art, and on a similar scale, with Mr. Gould's other highly-finished illustrations. The second part is now before us, equal in every respect to its predecessor, and containing figures of the following species: but before making any remark upon them, we cannot avoid alluding to the expedition which our author has in contemplation to make to Australia. Such a journey will be of the highest interest to the traveller; and knowing Mr. Gould's activity in the field, and his qualifications for observation and recording what he does observe, we look forward to his return with an intense interest. Many species have now been forwarded to Europe from this most interesting country, a few of them from very inland districts;

but with the exception of the skin alone, and the description of the outward form of the bird, we have received almost no other information; in fact, we are more deficient in our knowledge of the æconomy of Australian species than of those of any other quarter of the world. This department should be Mr. Gould's great object: he should endeavour to collect everything, together with what he can himself observe, regarding the manners of those species which have given rise to so much speculation among our systematists, and to secure for after-dissection individuals of the various genera, which he well knows have long been desiderata to the comparative anatomist, *Apteryx*, *Menura*, *Alectura*, &c. We firmly trust that health and strength may be spared to him actively to go about his work, and safely to return again to his native country.

Chatura macroptera. Mr. Gould should endeavour to procure information regarding the manners of this bird, particularly its *scansorial* habits. Most of the *Hirundinidæ* make use of the tail as a support when resting, or when constructing their nests; but the authenticity of the fact of their climbing on the face of cliffs in search of food rests scarcely on complete evidence, and it will be a curious circumstance if confirmed, in the æconomy of birds possessing so great extent and power of wing.—*Dacelo cervina*, a beautiful species, and apparently very rare; Mr. Gould remarks that only two specimens are known in London. This is another genus of birds worthy of attention; a good account of their manners would be a valuable acquisition to our knowledge.—*Pachycephala pectoralis*, M. & F. The females of this genus have frequently been described under distinct names from the opposite sex.—*Amadina castanotis*, M. & F.—*Nestor hypopolius*.—*Platycercus hamatogaster*, n. s.—*Myzomela nigra*, n. s., a curious species, the colours black and white, with nearly the same distribution as in *M. cardinalis*.—*Apteryx Australis*, an interesting figure of this very singular and still little-known bird. Mr. Gould mentions the existence of four specimens in the London collections, and from his examination of them has been led to conclude that it will range among the *Struthionidæ*, (where also Mr. Swainson places it in the tenuirostral type,) but that between the large members of this family and the *Apteryx* there may be supposed to exist several undiscovered intermediate links; indeed he mentions in the description, that at a meeting of the Zoological Society, a native of New Zealand, who was present, when shown the *Apteryx*, stated that he knew another kind, "with a shorter bill."—The last figure in the number is *Ægialitis* (Charadrius) *Monachus*, a chastely coloured species, and now not very uncommon in our collections.

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

Sept. 26th, 1837.— Richard Owen, Esq. in the Chair.

Two small quadrupeds from the Society's collection were exhibited by Mr. Waterhouse, who stated that he believed them to be undescribed species. The first was characterized as

GALAGO ALLENI. *Gal. auribus permagnis, digitis perlongis, vellere intensè plumbeo, rufescente lavato; corpore subtilis flavo lavato.*

Longitudo ab apice rostri ad caudæ basin, 5 unc. 1 lin.; caudæ, 10 unc.; auris, 1 unc. $2\frac{1}{2}$ lin.: latitudo auris, 11 lin.: longitudo pollicis antipedum, 6 lin., digiti longissimi, 1 unc. 1 lin.; pollicis pedum posticorum, 7 lin.; digiti longissimi, 1 unc. 2 lin.; pedis postici a calce ad apicem digitorum, 2 unc. 11 lin.

Hab. Fernando Po.

Obs. This specimen, which has four incisors in the upper jaw, and six in the lower, is about the same size as the *Galago Senegalensis*, but may be readily distinguished from that species by the greater size of the ears, (the length of which is equal to the distance between the tip of the muzzle and the base of the ear,) and the great length of the fingers and toes. In the colouring there is also a difference, *G. Senegalensis* being grey, washed with yellow, whereas *G. Alleni* is of a deep slate grey, all the hairs of the upper parts being of a rusty yellow at the apex, or, as on the fore legs, rusty at the tip. The under parts of the body are of a paler hue than the upper, the hairs being of a dirty yellow colour at the tip; but like those of the upper parts, they are of a slate grey for the greater portion of their length: on the throat and chin each hair is whitish at the apex. The hairs covering the feet are of a deep brown colour. The tail is dusky brown.

PTEROMYS (Sciuropterus) HORSFIELDII. *Pter. fuscus, pilis flavescenti-fuscis crebrè interspersis; corpore subtilis flavescenti-albo, genis et patagio lumbari ad marginem rufescenti-flavis; cauda subtilis nitide ferrugined; auribus mediocribus.*

Longitudo ab apice rostri ad caudæ basin, 9 unc. 6 lin.; auris, $7\frac{1}{2}$ lin.; tarsi digitorumque, 1 unc. 5 lin.

Obs. This species is of a larger size than the *Pteromys sagitta*, from which it differs in having the ears larger in proportion; the tail more bushy and of an uniform bright rust colour beneath; the margin of the flank skin is of a reddish yellow colour, as are also the sides of the face below the eye. On the upper parts of the body the fur is of a deep brown, each hair being grey at the base; the inter-

spersed longer hairs, which are abundant, are of a bright brown or reddish-yellow colour at the apex. The general tint produced by this mixture is rufous brown. On the under parts of the body the hairs are of a yellow or yellowish white colour, and not grey at the base.

The specimen from which the above description is taken is either from Java or Sumatra. I have taken the liberty of naming it after the author of the 'Zoological Researches in Java,' &c.

Mr. Gould exhibited from his Australian collection of Birds two species of the genus *Platycercus*, which he considered new: for one of these he proposed the specific name of *hamatonotus*, from the red spot upon its rump; and for the other, which he had very recently received, and which he remarked was one of the most beautiful species of the genus hitherto discovered, that of *hamatogaster*.

PLATYCERCUS HÆMATONOTUS. *Plat. summo capite, fronte, genis, nuchâ pectoreque smaragdino-viridibus; dorso fuscescenti-viridi; uropygio coccineo; articulo humerali, alâ spuria et pogoniis externis primum ad partem basalem nitidè cæruleo-nigris, notâ sulphuræ humerali. Remigibus majoribus et minoribus, rectricibusque caudæ duabus intermediis viridibus, hoc colore in cæruleum transeunte ad apicem, apicibus ipsis nigro-fuscis; rectricibus reliquis ad bases viridibus, ad apices et ad pogonia externa cineraceo-albis; abdomine medio flavo; femoribus obscure cæruleo-viridibus; crisso cineraceo-albo; rostro corneo; pedibus fuscis.*

Long. tot. 11 unc.; alæ 5; caudæ $6\frac{1}{2}$; tarsi $\frac{5}{8}$.

PULLUS intra annum primum, ab ave adultâ differt partibus, quæ in hæc smaragdino-viridibus, in illo cinerescenti-viridibus; necnon crisso haud coccineo, abdomine haud flavo; ast primariis nonnullis, secundariisque ad bases albis.

Hab. Novâ Cambriâ Australi.

Obs. This species unites *Platycercus* to *Nanodes*, and is in fact so directly intermediate between these genera in size and other characters, that it is difficult to decide to which group it should be referred; but I am induced to include it among the *Platycerci*.

PLATYCERCUS HÆMATOGASTER. *Plat. fronte facieque cæruleis; summo capite, nuchâ, plumisque auricularibus flavescenti-cinereis; pectore cinereo tincto brunneo; plumis auricularibus ad partem superiorem stramineis; uropygio, tectricibusque superioribus caudæ cerinis; articulo humerali pallidè cæruleo; primariis intense fuscis et ad apicem acutis; secundariis tectricibusque majoribus violaceo-cæruleis; tectricibus minoribus*

alisque ad partem superiorem intensè coccineis ; lateribus tectricibusque inferioribus pallidè flavis ; abdomine medio nitidè coccineo ; plumis duabus intermediis caudæ ad bases pallidè olivaceo-viridibus ad apices in cæruleum transeunte. Reliquis plumis ad bases intensè cæruleis ad apices in album transeunte ; rostro cornuo ; pedibus fuscis.

Long. tot. 12 unc. ; alæ $\frac{3}{8}$; caudæ 7 ; tarsi $\frac{3}{4}$.

Hab. Novâ Cambriâ Australi.

Mr. Gould also exhibited, on the part of Mr. Burton, a new species of Kingfisher, from the collection at Fort Pitt, Chatham, belonging to the genus *Ceyx*, of Lacépède. Mr. Burton had proposed to characterize it under the specific name of *microsoma*.

CEYX MICROSOMA. Ceyx subcristata. capite caudâque suprâ, nuchâ et humeris rufis ; strigâ ab oculis ad nucham (ponè oculos leviter, apud nucham intensè) dorso et uropygio hyalino splendentibus ; alis brunneis, pignoniis remigum internis rufo marginatis, tectricibus punctis hyalinis ornatis : infrâ pallidè rufa hoc colore apud ventrem dilutiore, mento, gulâ et strigâ auriculari albidis : rostro prægrandi, aurantiaco. Pedibus rubris.

Long. corp. $4\frac{1}{2}$ unc., capitis 2, rostri ab apice ad rectum $1\frac{1}{2}$; caudæ 1.

Hab. in Indiâ Maderaspatanâ.

Mr. Gould afterwards exhibited, on the part of the same gentleman, a specimen of the genus *Caprimulgus*, supposed to be the female of *C. monticolus*, and of which Mr. Burton had furnished the following description :

CAPRIMULGUS MONTICOLUS, Franklin. Fœmina? Capr. pallidior mari : remigibus maculâ notatis rufâ, ubi mas gaudet albâ ; jugulo rufo tincto ; caudâ rufâ nigro fasciatâ et inspersâ, rufo rectrices apud exteriores dominante, caudâque externâ maris albo omninò carente.*

Formâ et staturâ mari simillimâ.

Hab. in Indiâ septentrionali. In Musæo Medico-militari, Chatham.

Obs. The general form, character and colouring of this specimen harmonize so perfectly with those of *Caprimulgus monticolus*, that I have thought it safe to consider it as the female, until local observation or dissection shall have decided the question : at all events, it is new, and hitherto undescribed.

* Proceedings of the Committee of Science and Correspondence (Zool. Soc.), 1830-1.

A species of the genus *Carduelis*, also from the collection at Chatham, was characterized by Mr. Gould as

CARDUELIS BURTONI. *Card. fronte et regione circum-oculari pulchrè roseis ; vertice genisque nigris ; corpore obscurè fuscescenti-roseo, alis externè nigris, singulis plumis plùs minùsve albo ad apicem notatis ; ald spurid alba ; reatricibus caudæ nigris ; duabus, intermediis ad apicem albis, duabus proximis longius ad apicem albis, reliquis alba notd internè ad basin excurrente ornatis ; rostro pedibusque pallidè fuscis.*

Long. tot. $6\frac{1}{4}$ unc. ; rostri, $\frac{3}{8}$; alæ, $3\frac{7}{8}$; caudæ, $2\frac{1}{2}$; tarsi, $\frac{3}{4}$.

Hab. Himalaya.

Obs. I am indebted to the collection of Fort Pitt, at Chatham, for the knowledge of this very fine species of *Carduelis* : the specimen here characterized is, as far as I am aware, unique. It departs in some respects from the other members of the genus, particularly in the robust form of the beak, which is slightly angulated at the base : the form of its wings and tail, together with their peculiar markings, however, clearly points out that it is only an aberrant species of that group.

I have been induced to give this fine bird the specific appellation of *Burton*, for the purpose of paying a just compliment to Staff-Surgeon Burton, for the warm interest he took in the formation of the Fort Pitt collection, and for the readiness he has at all times evinced to aid in any way the advancement of zoological science.

BOTANICAL SOCIETY OF EDINBURGH.

The following gentlemen have been elected office-bearers for 1838 ;

President.

ROBERT GRAHAM, F.R.S.E., F.L.S., Professor of Botany in the University of Edinburgh.

Vice-Presidents.

JOHN HUTTON BALFOUR, M.D.

DAVID FALCONAR, Esq. of Carloutrie.

PATRICK HEILL, LL.D.

PROFESSOR CHRISTISON.

Council.

ANDREW DOUGLAS MARLAGAN, M.D.

WILLIAM McNAB, Esq.

JOHN HUTTON POLLEXFEN, M.D.

DAVID STEUART, Esq.

ROBERT KAYE GREVILLE, LL.D.

JOHN PERCY, Esq.

Secretary.—WILLIAM HUNTER CAMPBELL, Esq.

Treasurer.—WILLIAM BRAND, W.S.

Curator.—JAMES McNAB, Esq.

Foreign Secretaries.—EDWARD FORBES, Esq. and MARTIN BARRY, M.D.

January 11th, 1838.—Professor Graham, President, in the Chair.

Mr. R. W. Falconer read a Paper " On the ancient history of the Rose," in which he gave an account of the rose trees mentioned and

described by the Greek and Roman writers of antiquity ; also of the modes in which roses were cultivated, their periods of flowering, and the various uses to which they were applied. Theophrastus and Pliny appear to have given the fullest account of the rose, the former enumerating five kinds of roses, the latter fifteen, eleven of which, he says, were familiarly known to the Romans. After comparing the descriptions given by these authors with those of Dioscorides, Clusius, and other writers, Mr. Falconer proceeded to give an account of the ancient rosaria or rose plantations, collected from the various works of Pliny, Columella, and Palladius ; also of the means employed for propagating and forcing roses, mentioned by Theophrastus, Didymus, Pliny, and Seneca. The different localities renowned for their roses were next stated ; Nicander, Athenæus, and Pliny, being the principal authorities on this point. Among the ancients the rose was employed medicinally at their festivals and at their sacred ceremonies ; also as an article of luxury at their banquets and for making unguents. The uses of the rose among the Greeks and Romans were nearly the same, the latter nation, however, using them more profusely, and setting a higher value upon them. Anacreon was the first author whom Mr. Falconer could find to have mentioned the rose, and he flourished about 600 years B. C. Myrepsius, a medical writer of the 13th century, was the latest author quoted.

A communication from Mr. Edwin Lees of Worcester was then read, giving an account of a specimen of *Pyrus domestica*, Sm., or Sorb-tree, now growing in Wyre Forest, Worcestershire. Mr. Lees thinks it probable, from the situation of Wyre Forest, on the confines of three counties, Worcester, Salop, and an isolated portion of Stafford, that this locality for *Pyrus domestica* may have been inadvertently multiplied ; and that the station given by Dr. Plot and Ray in the " Moorlands of Staffordshire," may possibly refer to the specimen in question, which, however, is situated in the parish of Rock in Worcestershire, about three miles from Bewdley. From a close inspection of the locality, Mr. Lees is inclined to think that the tree alluded to is not there indigenous, although probably entitled to an antiquity of not less than 400 years. The vestiges of a habitation and garden he thought might be traced in some bricks and remains near the spot, and in the presence of solitary specimens of *Ligustrum vulgare* and *Prunus domestica*, the only individuals which he observed in the whole forest. The tree when visited in 1836 was much dilapidated, and presented the appearance of extreme old age, in the battered state of its bole, great height (about sixty feet), broken

lower branches, and tenuity and tortuosity of the upper ones, which only bear flower from the young shoots at their very ends. Fruit is produced annually, and is eagerly gathered as a curiosity by the country people, who look upon it as a charm, suspending it in their habitations, and appearing to consider it a safeguard; while to the mountain ash (*Pyrus aucuparia*) they pay no sort of attention, although they seem to be fully aware of the relationship between the species, designating the latter the "Whitten tree," while the former is called the "Whitten Pear-tree,"—the fruit very much resembling a small jennet pear. The stations given for *Pyrus domestica* in Cornwall and the Isle of Wight, Mr. Lees thinks rest on doubtful authority, and that its claims to being considered indigenous to Britain would require to be based on a stronger foundation than that afforded by the solitary individual in Wyre Forest.

LINNEAN SOCIETY.

March 6, 1838.—Mr. Forster, V.P., in the Chair.

Mr. Newman, F.L.S., exhibited specimens of the *Noctua cubicularis* in the larva state, obtained from Ham Green, near Bristol, the seat of Richard Bright, Esq., where this caterpillar had proved very destructive to wheat in the rick.

Dr. Bromfield, F.L.S., exhibited a specimen of a singular variety of *Crepis virens*, with the leaves nearly entire, gathered by him in a wood near Yarmouth in the Isle of Wight.

A plant in flower of the rare *Ophrys lutea* of Cavanillas was exhibited by Mr. Anderson, from the Apothecaries' Garden at Chelsea.

Read a description of the Mosses collected in the journey of the late deputation into Upper Assam, in the years 1835 and 1836. By William Griffith, Esq., Assistant Surgeon on the Madras Establishment. Communicated by R. H. Solly, Esq., F.R.S. & L.S.

The discovery of the China tea plant in Upper Assam attracted the attention of the Indian government, and accordingly a deputation, consisting of Dr. Wallich, Mr. McClelland, and Mr. Griffith, was sent from Calcutta to investigate the subject. The present paper comprises descriptions of the Musci collected in the journey; but the greater portion of the species, Mr. Griffith states, was gathered in the Khasya Hills, an elevated tract of country, forming part of the eastern frontier of British India. The breadth of this tract varies from thirty-five to sixty English miles, and the following heights of places situated on the route of the mission, and copied from Captain Pemberton's report, are given by Mr. Griffith.

| | feet. |
|---------------------|-------|
| Churra Punjee | 4349 |
| Surureem | 5600 |
| Mollong | 5912 |
| Myrung | 5910 |
| Nunktow | 1553 |

The climate is described to be excessively moist, which will account for the large number of mosses collected in the journey by Mr. Griffith, forming about one eighth of the entire family, 1324 being the amount of species enumerated by Bridel in his *Bryologia Universa*. We subjoin a list of the genera, together with the number of species contained in each.

| | | | |
|---------------------------|----|---------------------------|-----|
| <i>Sphagnum</i> | 1 | Brought up | 62 |
| <i>Polytrichum</i> | 6 | <i>Bartramia</i> | 3 |
| <i>Diphyidium</i> | 1 | <i>Brachymenium</i> | 3 |
| <i>Gymnocladium</i> | 7 | <i>Bryum</i> | 7 |
| <i>Orthodon</i> | 1 | <i>Pterogonium</i> | 4 |
| <i>Orthotrichum</i> | 5 | <i>Neckera</i> | 20 |
| <i>Schlotheimia</i> | 1 | <i>Daltonia</i> | 1 |
| <i>Weissia</i> | 3 | <i>Pleuropus</i> | 3 |
| <i>Barbula</i> | 3 | <i>Anhymentum</i> | 1 |
| <i>Grimmia</i> | 3 | <i>Hookeria</i> | 4 |
| <i>Trematodon</i> | 2 | <i>Leskea</i> | 7 |
| <i>Dicranum</i> | 13 | <i>Hypnum</i> | 28 |
| <i>Fissidens</i> | 10 | | |
| <i>Dudleyodon</i> | 4 | | 113 |
| <i>Funaria</i> | 2 | Undetermined | 9 |
| | 62 | Total species | 152 |

The collection contains *Sphagnum obtusifolium*, *Polytrichum urnigerum* and *aloides*, *Weissia Templetoni*, *Dicranum scoparium* and *glau-cum*, *Bartramia fontana*, and several others familiar to the European muscologist; but the far greater part of the species have not been previously described.

March 20.—Dr. Horsfield, V.P., in the Chair.

Read a description of the Mora tree. By Mr. Robert H. Schomburgk. Communicated by George Bentham, Esq., F.L.S.

This tree is a native of the forests of British Guiana, where it attains a large size, the trunk often exceeding ninety feet in height, with a circumference of upwards of twenty feet. The trunk produces large buttresses at its base, which from their partial decay afterwards become hollow beneath, and form a chamber capable of sheltering several persons standing erect. The tops of these buttresses, and the trunk itself, are found clothed with innumerable epiphytes, which greatly add to the singularity of the tree. The tree affords timber of excellent quality, being close-grained, strong,

tough and durable, and not liable to split. The Mora tree constitutes a new genus of the order *Leguminosæ*, belonging to the sub-order *Casalpineæ*, and tribe *Cassiæ*. Mr. Bentham adopts the native name for the genus, and proposes that of *excelsa* for the species. The following is his character of the genus.

MORA. Benth.

Calyx urceolato-campanulatus, breviter et late 5-dentatus, aestivatione imbricativa. *Corolla*: petala 5, æqualia. *Stamina* 10, exserta, quorum 5 petalis opposita, fertilia sunt, antheris bilocularibus medifixis longitudinaliter dehiscentibus, 5 petalis alterna filiformia, antheris clavatis cassis. *Ovarium* breviter stipitatum, pluriovulatum. *Stylus* compressus, subrectus, stigmate tenui terminali. *Legumen* coriaceo-lignosum, oblongum, abortu (an constanter?) monospermum. *Semen* magnum, reniforme, cotyledonibus crassis, radicula conica recta.

The genus is nearly related to *Tachigulia* of Aublet, and *Leptolobium* of Vogel, but differs from both in the woody texture of the pod, which is moreover naturally dehiscent, in the greater regularity of the parts of the flower, and in the sterility of the alternate stamina.

April 3.—The Bishop of Norwich, President, in the Chair.

Read a communication on the existence of Stomata in Mosses. In a letter to R. H. Solly, Esq., F.R.S. & L.S. By William Valentine, Esq., F.L.S.

The discovery of stomata in mosses was reserved for Mr. Valentine, an opinion of their absence from that family having universally obtained amongst botanists. It was in *Bryum crudum* that Mr. Valentine first detected stomata, and of one hundred and three British mosses examined by him, seventy-eight were found to possess these organs. Their situation in this family is very remarkable, being confined, with one exception, to the theca, and the thinness of the tissue will readily account for their absence from other parts. In *Bryum crudum* they occur only on the apophysis, and wherever that organ is present they are to be met with. On the apophysis of several species of *Splachnum* they exist in considerable abundance, but in *S. ampullaceum* they are confined to the upper part of that organ, being the only spot where the subcutaneous tissue has separated from the cuticle. They occur on the whole of the theca in *Encalypta ciliata* and *vulgaris*, and in several species of *Orthotrichum*. In *Edipodium Griffithianum* they exist on the upper part of the fleshy seta, as well as on the apophysis. In many mosses without the apophysis, they are found in a single row at the base of the theca, as, for instance, in *Trichostomum patens*, and in the genus *Phascum*, with

the exception of *Phascum alternifolium*, which is wholly destitute of them. They are found equally on the most fully developed species, such as *Hypnum rutabulum*, as well as on the very lowest, of which *Phascum serratum* affords an example, while on the contrary they are wanting in species of both extremes, as *Hypnum denticulatum* and *Phascum alternifolium*. Their number and size vary according to the age of the theca; in the very young theca they are very small, and much less numerous than on the mature organ. In *Orthotrichum diaphanum* when mature they are from twenty to twenty-five, whilst on the very young theca Mr. Valentine has found as few as five. They are very numerous on the apophysis of *Funaria hygrometrica*.

The more common form of the stomata in mosses is similar to that generally found amongst phænogamous plants. Each consists of two oblong reniform cells, with their concave sides opposed to each other. In *Funaria hygrometrica* they consist of a single cell in the form of a hollow ring, and in five British species of *Orthotrichum* (*diaphanum*, *pulchellum*, *reticulare*, *anomalum*, and *cupulatum*) they have a raised border of projecting cells which form a cavity above the stoma, resembling somewhat those of *Marchantia* and *Targionia*.

Mr. Anderson, F.L.S., exhibited, from the Chelsea Botanic Garden, flowering plants of *Pterostylis concinna* and *Perdicium lyratum*.

April 17.—The Bi-hop of Norwich, President, in the Chair.

Read a paper by Prof. Don, Libr. L.S., describing two new genera of the natural family of plants called *Coniferae*.

These two genera belong to the *Cupressineæ*, to which they form an interesting addition, from their peculiarities of habit and structure, and they differ from all the genera hitherto established of that group by the female spikes assuming the form of a cone, as in *Pinus*. The *Cupressineæ* are characterised by their reproductive organs having a tendency to become indefinite, by their atropous ovula, naked buds, and other peculiarities of habit. The following are the essential characters of these two genera.

CRYPTOMERIA.

Cupressi sp. *Lin. Fil.*

Amenta mascula spicata. *Squamæ antheriferae* rotundatae, adpressè imbricatæ, sessiles. *Antherarum thecæ* 5, connatæ! basi squamarum omninò adnatæ, anticè foramine amplo dehiscentes. *Ovula* erecta. *Strobili* solitarii, globosi, squarrosi: *squamis* è pericarpio 3—6-dentato bracteæque lanceolatâ acuminatâ infernè concretis compositis. *Semina* 1 v. 6, compresso-angulata, vix alata.

Arbor (japonica) *procera, sempervirens*. *Folia* ferè omninò *Araucariæ Cunninghamii*, 5-fariàm ordinata, subulata, viridia, verticalitèr com-

pressa, vix pollicaria. Amenta mascula in spicam terminalem aggregata; feminea solitaria, globosa.

1. *C. japonica.*

Cupressus japonica. Linn. Fil. Suppl. 421.

Habitat in Insulâ Nipponiæ.

The habit of this tree is so like that of *Araucaria Cunninghamii*, that a branch of the one might readily be mistaken for that of the other. The male catkins, which in the other genera of *Cupressineæ* are solitary, are here numerous, as in the normal tribe of *Pinus*, and crowded in a spike-like manner at the extremity of the branches. The thecæ, five in number, are unilocular, very short, combined together in a single series, concealed at the base of the scales, and open inwardly towards the axis by a large aperture. The female catkins are solitary, globular, and squarrose. The scales, or pericarpia, apparently consist each of a verticil of leaves combined together and concrete with the bracte, which is much developed. The ovula vary from four to six, and appear to bear some relation to the divisions of the pericarpium. The more complex structure of this genus appears to confirm the accuracy of Mr. Brown's view of the scales being the pericarpial leaves, and to militate against the opinion lately advanced by Dr. Schleiden,* who regards the scale or expanded pericarpium of *Abietineæ* as the placenta, and what has hitherto been regarded as the bracte as the true pericarpial leaf.

The wood of *Cryptomeria* is compact, and the fibrous tissue is composed of very slender vessels, united generally by their truncated ends, and furnished on the sides parallel to the medullary rays with a single row of minute dots, having a circular outline, and an opaque centre, much smaller and more crowded than in *Pinus*.

The author's description of this remarkable tree is taken from a specimen communicated by Thunberg to the younger Linnæus, and now forms part of the extensive collections of the Linnæan Society.

ATHROTAXIS.

Amenta mascula solitaria, multiflora, capitata, laxa. Squamæ antheriferæ longè unguiculatæ, subfastigiatæ. Antherarum thecæ 2. bivalves, distantes, divaricato-patentes. Ovula 3, pendula. Strobili squamæ indefinitæ, lanceolatæ, acutæ, regione seminiferâ incrassatâ. Semina 2 v. 3, compressa, margine altero alato.

Arbusculæ (Tasmanienses) sempervirentes, facie Lycopodiorum, foliis imbricatis, amentis terminalibus solitariis sessilibus.

The habit of this singular genus recalls to mind the *Lepidodendra*,

* For Dr. Schleiden's interesting memoir on this subject, vide *Philosophical Magazine*, vol. xii. p. 172.

those forms which at present exist only in a fossil state; their axis is studded with the persistent adherent bases of the leaves, resembling the lozenge-shaped marks on the stem of the fossil genus above-mentioned, and the ramification frequently presents a dichotomous appearance, which arises from the non-development of one of the lateral branches, the normal arrangement in this genus being a primary axis with two opposite lateral ones. The bases of the leaves of *Lycopodiaceæ* being so completely continuous with the axis would not present such marks as those mentioned, and the author is therefore inclined to consider *Lepidodendron* as allied rather to *Conifera* than to that family, and the present interesting genus appears to present us with an evident link of connexion. The scales, as they are usually termed, of the male spike of *Conifera*, the author regards as the anthers, although usually presenting a foliaceous character, a portion only of the subcutaneous cellular tissue being converted into pollen. It is generally the under surface of the modified leaf or anther that becomes polliniferous, the upper surface remaining most frequently unchanged. These polliniferous thecæ are analogous to the subdivisions of the anthers in *Rhizophoræ*, *Laurineæ*, &c., and are in all cases unilocular, being destitute of any septum, and their line of dehiscence is various, being sometimes in the direction of the axis, and sometimes contrary to it. I ought to except *Athrotaxis* and *Pinus*, in both of which the scales differ but little from the ordinary condition of the anthers of other plants. The author's opinion of the scales being simple, and not originating from the confluence of several anthers, is founded upon their resemblance to the bractes, from their nervation, which is entirely that of a simple leaf, exhibiting no traces of composition. The wood of *Athrotaxis* presents nothing unusual in its structure, but resembles that of *Cryptocaria*, except that the dots are fewer.

The following are the characters of the two species of this genus :

1. *A. selaginoides*, foliis lanceolatis acuminatis laxè 5-fariàm imbricatis, squamis antheriferis acutis.
2. *A. cupressoides*, foliis ovatis obtusis adpressè 4-fariàm imbricatis, squamis antheriferis ellipticis obtusis.

The author is indebted to Dr. Lindley for the opportunity of giving descriptions of both species of this interesting genus, the specimens from which they were taken being contained in his rich herbarium, and had been sent to him by Mr. Gunn, a medical gentleman and a zealous botanist, who is settled at Launceston in Van Diemen's Land.

Read a paper by Charles Lush, M.D., F.L.S., on the identity of three described species of *Acacia*.

The species are, *A. Lebbek* of Linnæus, *speciosa* of Willdenow, and *Sirissa* of Roxburgh, which Dr. Lush has satisfactorily proved to be identical. They will all range under *Acacia Lebbek*, which, although extensively cultivated as an ornamental tree in Egypt, is not indigenous; and Dr. Lush suspects that it had originally been imported from the Deccan, and its Indian name, Serisch, as recorded by Forskål, appears to support this opinion. The leaves on the same tree vary in the number of the pinnae.

PROCEEDINGS OF THE ROYAL ACADEMY OF BERLIN.*

Feb. 20, 1837.—M. Horkel read a paper on the structure of the seed and on the germination of the genus *Pistia*. A specimen of *Pistia Stratiotes*, Bonpl. (not of Linnæus), from Brazil, preserved in spirit, had enabled him to add a few additional notices to what had already been published by Mirbel, Turpin, and Lindley respecting the seeds of other species of *Pistia*.

It is easy to conceive, that as his precursors had employed for their examination only dry seeds, in which the true form is not restored by any length of moistening, they have described and figured it as cylindrical and very rugose, while it is pear-shaped and smooth, as Louis Née, who had the opportunity of observing fresh *Pistia* seeds in many quarters of the globe, describes it, comparing its form to that of a small pestle. This pear-shaped form of the seed originates through a considerable thickening of the spongy testa at the free or micropyle extremity of the seed, while the chalaza extremity becomes gradually thinner and passes quite imperceptibly into the thick short funiculus, whence originates a considerable cavity at the separation of the ripe seed in the proximity of the chalaza. The third reticulate coat of the seed described by Mirbel is not present, but there are on more than the two ordinary ones, testa and membrana interna. The first of these was considered, quite erroneously, by Turpin as an arillus.

Although M. Horkel found on his specimen ovula and seeds in all their stages of growth, so that he could even plainly detect the course of the pollen tubes from the style into the ovula, yet much of the interior of the full-grown ovula had become opaque, from the too great strength of the spirit, rendering it impossible for him to give a complete history of the development. However he saw thus much of it, that the nucleus is very early obliterated by the rapid extension of

* Translated from the Bericht über die Verhandlungen der königl. Akademie der Wissenschaften zu Berlin.

the embryonal sac; when therefore Mirbel speaks of a *Périsperme farineux*, he uses this term in the old indefinite sense, for since the embryo-trophic mass is formed in the same sac with the small cylindrical embryo, it must be named, according to the minute distinction of modern Carpology, endosperm and not perisperm.

From the smallness of the seed of *Pistia*, Bonpl. nothing could be ascertained for certain as to the structure of the embryo itself. However in the *Pistia (Stratiotes) Jacq.*, where the seeds are twice the size, he succeeded in convincing himself of the presence of the aroidal fissure, which was doubted by Lindley, and which in *Pistia*, as in *Calla*, &c., has a longitudinal direction, and not, as in *Lemna*, a transverse one, round the radicular end of the embryo. M. Horkel further found that the gemmule is not a pointed convolution of leaves, such as Mirbel and Turpin have figured it, but is a round thick disk, situated obliquely in the radicular extremity of the embryo, and is connected for some length with the wall of the embryo situated opposite to the rima.

As up to the present time there have been no observations made on the germination of *Pistia*, the following, although in some degree imperfect, as only dried germinating plants were at M. Horkel's disposal, will still add some little to our knowledge of the germination of this plant. We must expect a more perfect history from such botanists only who have occasion to study its germination within the tropics, or we must have at our disposal at least an entire series of the plant in the various states of its germination well preserved in spirit.

The germination begins in *Pistia* as in *Lemna* with the separation of a thickened part of the *membrana interna*, occurring round the micropyle, and consisting of long radiating cells, with which in *Pistia* the superincumbent portion of the testa, through which the micropyle canal passes, also separates in the form of an operculum; and in *Pistia* as in *Lemna* remains stationary at its original place, the radicular end of the embryo, which in both plants is raised in the form of a sac, so that the spreading gemmule leaf in the interior of this sac (in *Lemna* it is the entire discoidal *plantula seminalis*), remains for a long time hidden, until at last it is forced through the widened fissure, and thus shows itself as the first leaf of the germinating plant, and soon afterwards the radicle primitiva is thrown out at the side opposite to the rima, only not so high. This is also in the beginning covered by a disk-like prolongation of the embryo, which is pierced at a later period, when the radicle with its end covered as in *Lemna* with a calyptra, becomes evident. The simple radiculae of the germinating plant, which at a later period are formed in abundance, have

not only a similar calyptra, but calyptræ also occur at all the healthy parts of the compound roots of the full-grown plant, proving evidently that the *Pistia* are floating plants during the entire period of their existence. The second, but later developed, leaf of the germinating plant has the same flat disk-like form as the first gemmule leaf, and the third is the first which appears to have the æstivatio conduplicata of the later leaves. As soon as these three leaves have spread themselves on the water, a large quantity of simple radiculae are developed downwards, among which, at times, occur compound roots similar in miniature to those of the grown plant. The result of these observations is therefore, that *Pistia* from the structure of its gemmula and from its germination approaches to *Lemna*, but as this latter in all other respects stands in a much inferior scale of organization, it is impossible to agree with Lindley, who brings them both together in one family, the *Pistiaceæ*; but it would be best to make of the two plants two different small anomalous families of the *Aroideæ*.

MISCELLANEOUS.

NEW BRITISH ZOOPHYTE.

Miss Attersoll has lately discovered, on the coast of Sussex, the *Cornularia rugosa* of Cavolini, growing on a *Tubularia*, and has communicated specimens of these interesting zoophytes to the British Museum. This genus has hitherto been believed to be confined to the Mediterranean. It differs from most other thorny zoophytes in the tentacles being pinnate like those of *Gorgonia*.—J. E. Gray.

SPEAKING CANARY BIRD.

The attention of some of our friends has lately been called to what, so far as we know, is a novel fact, namely, the power of articulation having been acquired by a canary-bird, in the possession of Mrs. Hardy, of No. 28, Piccadilly, by whom it was brought up from the nest. This docile little creature has certainly learnt to imitate with surprising success some phrases which had often been addressed to it, and possesses a faculty which had never been suspected in the family to which it belongs.

LARUS MINUTUS.

A beautiful adult specimen, in the winter plumage, was shot near Newton, Northumberland, by the sea, in February, 1838, and is now in possession of Mr. Embleton, surgeon, Embleton. This is the first recorded instance of its appearance upon the Northumbrian coast.—P. J. S.

SYNGNATHUS AQUOREUS.—Yarrell.

A fine specimen of *S. Aquoreus* was found upon the sea beach near Bamborough, in February, 1838. It measures $18\frac{1}{2}$ inches in length, and agrees in all respects with the description of the species given by Mr. Yarrell in his History of British Fishes.—P. J. S.

PETROMYZON PLANERI.

Upon turning to Jenyns' Manual of Brit. Vert. and Yarrell's Brit. Fishes, I find that this little fish has only been noticed in a few parts of the kingdom. I therefore suppose that it will be interesting to naturalists to learn that it occurs frequently in small brooks in the neighbourhood of Framfield, Sussex, where I have recently taken numerous specimens.—April 19, 1838. Robert M. Lingwood.

It is Mr. D. Cooper's intention to form a class this summer (similar to the one last year) for the study of Practical Botany. The excursions to take place twice every month, from the beginning of May. The day hereafter to be fixed most convenient to those who may form the Class.—82, Blackfriars Road.

Chiswick.—March 1, 2. Rain. 3. Fine: rain. 4. Rain: foggy. 5. Overcast. 6. Clear: cloudy: clear at night. 7, 8. Fine. 9. Frosty: fine. 10—12. Very fine. 13. Rain. 14. Hazy: fine. 15. Fine. 16. Fine: stormy showers at night. 17. Clear and cold: showery. 18. Cloudy and fine. 19. Drizzly. 20. Boisterous, with showers. 21. Clear, cold and dry. 22. Hazy: rain. 23. Bleak and cold, with slight snow-showers. 24. Fine: rain. 25. Fine. 26. Frosty and hazy. 27, 28. Fine. 29. Foggy: very fine. 30. Fine. 31. Hazy and cold.

Boston.—March 1, 2. Cloudy: rain early A.M. and P.M. 3. Cloudy. 4. Cloudy: rain A.M. and P.M. 5. Cloudy. 6. Fine: rain early A.M.: hurricane with rain P.M. 7. Fine: stormy with rain P.M. 8—12. Fine. 13. Rain. 14—16. Cloudy. 17. Fine: snow early A.M. 18. Fine. 19. Cloudy. 20. Stormy: rain early A.M. 21. Stormy. 22. Cloudy. 23. Snow A.M.: rain P.M. 24—27. Fine. 28. Cloudy. 29. Fine. 30, 31. Cloudy.

Applegarth Manse, Dumfriesshire.—March 1. Soft weather: dull and cloudy. 2. Rain: soon ceased. 3. Rain and sleet: cleared in the evening. 4. Fair and mild: chill in the evening. 5. Fine and clear: wet in the evening. 6. Storm of wind and rain. 7. Showery, with wind. 8. Clear, but cold: morning frosty: sun shone out. 9. Frosty: cloudy: raw in the evening. 10. Cloudy: wet afternoon. 11. Soft rain. 12. Fine day, but frosty: sun shone out. 13. Fine rain, but soon ceased. 14. Soft and genial shower. 15. Brisk wind and dry: sun shone out. 16. Hail showers: sleet: wind. 17. Showers of snow: high wind. 18. Frosty: clear: sun shone out. 19. Soft: cloudy: watery. 20. Stormy: wind and rain. 21. Dry and cold. 22. Sprinkling of snow: cold: sun shone out. 23. Frosty: slight snow: sun shone out. 24. Frosty: fine day: sun shone out. 25. Fine day: snow on the hills: sun shone. 26. Drizzling day, but cleared and sun shone. 27. Fine spring day: sun shone. 28. Fog in the morning: cleared: sun shone. 29. Fine and clear: sun shone out. 30. Fog: sunshine for half an hour. 31. Dull and cold: sun shone for a little.

Meteorological Observations made at the Apartments of the Royal Society by the Assistant Secretary, Mr. ROBERTSON; by Mr. THOMPSON at the Garden of the Horticultural Society at Chiswick, near London; by Mr. VALL at Boston, and by Mr. DUNBAR at Applegarth Manse, Dumfriesshire.

| Days of Month. | | | Barometer. | | | | Thermometer. | | | | Wind. | | | | Rain. | | | Dew-point. | |
|----------------|--------|--------|------------|--------|-----------|--------|----------------|--------|-----------|--------|-----------|--------|-----------|---------|-----------|--------|-----------|------------|------------|
| Month. | | | Chiswick. | | Boston. | | Self-register. | | Chiswick. | | Dumfries. | | London. | | Dumfries. | | London. | | Dew-point. |
| 1898. | | | Max. | Min. | 1894. | Max. | Fahr. | Max. | Min. | Max. | Min. | Sum. | 9 p.m. | London. | Max. | Min. | Sum. | 9 p.m. | Dew-point. |
| March. | | | Dumfries. | | Dumfries. | | Dumfries. | | Dumfries. | | Dumfries. | | Dumfries. | | Dumfries. | | Dumfries. | | Dew-point. |
| | | | 9 a.m. | 9 p.m. | 9 a.m. | 9 p.m. | 9 a.m. | 9 p.m. | 9 a.m. | 9 p.m. | 9 a.m. | 9 p.m. | 9 a.m. | 9 p.m. | 9 a.m. | 9 p.m. | 9 a.m. | 9 p.m. | Dew-point. |
| 1. | 29-124 | 29-140 | 28-83 | 29-06 | 29-04 | 43-7 | 49-2 | 41-8 | 49 | 38 | 41 | 36 | 36 | N. | E. calm | N.E. | 1-13 | 39 | 39 |
| 2. | 29-094 | 29-225 | 29-116 | 29-05 | 29-10 | 41-7 | 48-0 | 40-9 | 44 | 36 | 39 | 36 | 36 | S. | E. calm | E. | -088 | 40 | 40 |
| 3. | 29-246 | 29-266 | 29-256 | 29-12 | 29-10 | 42-0 | 45-0 | 41-4 | 51 | 28 | 37 | 34 | 34 | W. | S.E. calm | E. | -063 | 39 | 39 |
| 4. | 29-030 | 29-221 | 29-010 | 29-08 | 29-07 | 38-5 | 45-3 | 37-6 | 48 | 37 | 37 | 35 | 35 | N.E. | S.E. W. | E. | -025 | 38 | 38 |
| 5. | 29-614 | 29-826 | 29-23 | 29-50 | 29-42 | 41-2 | 47-6 | 38-4 | 46 | 39 | 40 | 36 | 35 | N.W. | N.E. calm | E. | -108 | 37 | 37 |
| 6. | 29-706 | 29-974 | 29-766 | 29-30 | 29-25 | 46-6 | 47-0 | 40-7 | 53 | 31 | 44 | 37 | 38 | W.S.W. | S.W. calm | S.W. | -161 | 40 | 40 |
| 7. | 29-912 | 29-966 | 29-927 | 29-44 | 29-47 | 41-9 | 51-3 | 37-0 | 53 | 34 | 40 | 38 | 35 | W. | W. W. | S.W. | ... | 57 | 57 |
| 8. | 30-116 | 30-329 | 30-118 | 29-64 | 29-86 | 42-2 | 50-0 | 37-8 | 51 | 25 | 38 | 35 | 35 | N.W. | N.W. calm | N.W. | -02 | 36 | 36 |
| 9. | 30-302 | 30-336 | 30-187 | 29-87 | 30-13 | 37-3 | 47-8 | 35-2 | 51 | 28 | 36 | 32 | 37 | N.W. | E. calm | N.W. | -05 | 37 | 37 |
| 10. | 30-000 | 30-033 | 29-896 | 29-64 | 29-71 | 40-3 | 44-9 | 35-0 | 51 | 30 | 36 | 36 | 39 | S.E. | S. calm | E. | ... | 38 | 38 |
| 11. | 29-778 | 29-929 | 29-802 | 29-44 | 29-50 | 39-8 | 46-4 | 38-0 | 52 | 29 | 40 | 38 | 38 | S. | S. calm | S.E. | ... | 36 | 36 |
| 12. | 30-120 | 30-277 | 30-154 | 29-72 | 29-98 | 38-8 | 46-0 | 35-9 | 52 | 27 | 36 | 35 | 37 | E. | S. calm | S.E. | ... | 35 | 35 |
| 13. | 30-052 | 30-255 | 30-118 | 29-70 | 29-98 | 38-8 | 46-0 | 35-9 | 52 | 45 | 40 | 41 | 46 | S.E. | S.W. calm | W. | -04 | 37 | 37 |
| 14. | 30-262 | 30-448 | 29-962 | 29-57 | 29-81 | 41-8 | 46-8 | 37-0 | 52 | 40 | 43 | 51 | 44 | W. | S.W. calm | S. | ... | 43 | 43 |
| 15. | 29-948 | 30-016 | 29-965 | 29-46 | 29-73 | 50-6 | 51-4 | 41-8 | 60 | 24 | 42 | 35 | 36 | N.W. | N. N. | W. | -06 | 39 | 39 |
| 16. | 29-900 | 29-927 | 29-636 | 29-39 | 29-37 | 46-5 | 58-3 | 44-6 | 50 | 24 | 39 | 38 | 35 | W. | W. calm | W. | -180 | 36 | 36 |
| 17. | 29-480 | 29-507 | 29-453 | 29-00 | 29-20 | 41-8 | 48-4 | 37-2 | 52 | 32 | 39 | 38 | 35 | W. | N.W. calm | S.W. | ... | 38 | 38 |
| 18. | 29-618 | 29-649 | 29-635 | 29-24 | 29-40 | 41-3 | 50-0 | 36-3 | 49 | 32 | 34 | 34 | 32 | N.W. | N.W. calm | S.W. | ... | 42 | 42 |
| 19. | 29-222 | 29-640 | 29-565 | 29-22 | 29-42 | 41-2 | 46-0 | 39-8 | 50 | 36 | 37 | 32 | 37 | S. | S. calm | W. | -02 | 38 | 38 |
| 20. | 29-394 | 29-424 | 29-248 | 28-70 | 28-62 | 50-2 | 51-7 | 41-0 | 54 | 33 | 51 | 40 | 35 | S.W. | W. W. | W. | -02 | 37 | 37 |
| 21. | 29-582 | 29-574 | 29-538 | 28-97 | 29-30 | 43-7 | 53-3 | 36-0 | 53 | 31 | 41 | 36 | 34 | S.W. | W. W. | W. | -055 | 38 | 38 |
| 22. | 29-580 | 29-628 | 29-563 | 29-24 | 29-47 | 43-0 | 49-3 | 35-8 | 40 | 28 | 37 | 34 | 30 | S.W. | W. N. | N.W. | -01 | 37 | 37 |
| 23. | 29-566 | 29-584 | 29-432 | 29-20 | 29-37 | 41-0 | 42-6 | 35-4 | 48 | 37 | 33 | 32 | 32 | N.W. | N. N. | N. | -01 | 31 | 31 |
| 24. | 29-620 | 30-098 | 29-849 | 29-28 | 29-48 | 44-8 | 47-2 | 36-4 | 53 | 25 | 35 | 35 | 34 | S.W. | S. calm | E.S.E. | -05 | 35 | 35 |
| 25. | 30-130 | 30-212 | 30-139 | 29-71 | 29-88 | 42-7 | 50-8 | 35-2 | 55 | 27 | 38 | 38 | 37 | N.W. | W. W. | W. | -036 | 37 | 37 |
| 26. | 30-312 | 30-409 | 30-313 | 29-83 | 30-11 | 43-9 | 51-1 | 35-4 | 57 | 29 | 44 | 44 | 41 | N.F. | N.E. calm | W. | ... | 35 | 35 |
| 27. | 30-524 | 30-536 | 30-525 | 30-07 | 30-34 | 43-8 | 54-1 | 40-0 | 59 | 30 | 40 | 40 | 36 | N. | N. calm | S.W. | ... | 38 | 38 |
| 28. | 30-530 | 30-556 | 30-531 | 30-04 | 30-38 | 43-4 | 52-5 | 38-7 | 62 | 46 | 48 | 37 | 42 | N.F. | N.E. calm | S.E. | ... | 40 | 40 |
| 29. | 30-488 | 30-503 | 30-278 | 29-83 | 30-30 | 51-8 | 57-0 | 40-2 | 60 | 38 | 52 | 40 | 38 | N.W. | N.W. calm | S.E. | ... | 46 | 46 |
| 30. | 30-180 | 30-162 | 29-71 | 29-71 | 30-10 | 45-8 | 56-4 | 41-8 | 52 | 26 | 43 | 33 | 29 | N.W. | N. N.E. | E.N.E. | ... | 43 | 43 |
| 31. | 29-815 | 29-895 | 29-783 | 29-38 | 29-59 | 42-7 | 49-2 | 38-1 | 51-45 | 32-74 | 40-3 | 36 | 36 | ... | ... | ... | ... | 1-09 | Mean. |
| Mean. | | | | | | | | | | | | | | | | | | | 38-2 |

ANNALS OF NATURAL HISTORY.

XXV.—*On the Snowy Owl, Surnia nyctea, Dumeril.* By
WILLIAM THOMPSON, Esq., Vice-President of the Natural
History Society of Belfast.

ON the 2nd of December, 1837, a beautiful specimen of the snowy owl was shot in a quarry on Scrabo mountain in the county of Down, and came into the possession of Thomas M'Leroth, Esq., of Killinether House, in that neighbourhood, who liberally presented it to the Belfast Museum. Having come under my inspection in a recent state, I drew up the following description of it, which, differing in some particulars from that of other specimens described in detail*, and for the purpose of comparison with individuals noticed in the sequel, may not be superfluous.

| | inch. | line. |
|--------------------------------------------------------------|-------|-----------------|
| Length, entire | 21 | 0 |
| Length of wing from carpus to end of longest quill | 16 | 6 |
| ———— tarsus | 2 | 3 |
| ———— bill measured along ridge | 1 | 9 |
| ———— cere on its ridge | 0 | 9 |
| ———— bill in a straight line from rictus to outer edge | 1 | 9 |
| ———— middle toe | 1 | 6 |
| ———— its claw, following curvature | 1 | 8 |
| ———— its claw in a straight line | 1 | 3 $\frac{1}{2}$ |
| ———— inner claw, following curvature..... | 1 | 9 |
| ———— outer claw, following curvature..... | 1 | 6 |
| ———— hind claw, following curvature | 1 | 5 |
| Wings pass the tail | 1 | 6 |

Extent of wings 4 feet 9 $\frac{1}{2}$ inches; first quill 1 $\frac{1}{2}$ inch shorter than the second, which is about 2 lines shorter than the third, this being the longest; the fourth is about 2 lines shorter than the second, the fifth 2 lines less than the first in length: this relative proportion of the quills is the same in another specimen preserved in the Belfast Museum.

Colour of forehead, throat and upper portion of breast,

* See 'Fauna Boreali-Americana,' Part 2. p. 190.

lower part of belly, under tail coverts, under side of wings, (except the roundish spots towards the points of primaries, secondaries, and tertials,) and entire legs, white. Plumage of the body beneath the wings, lower part of breast and upper portion of belly, white, beautifully barred with blackish-brown in waved and variously formed lines, about half an inch apart, and becoming narrow as they approach the tail; the greatest breadth of these dark bars about $1\frac{1}{2}$ line. Feathers of the occiput white, tipped with black; lower part of nape where the head joins the body white; back, scapulars, and coverts of the wings, white, closely barred with blackish brown. Primaries, secondaries, and tertials (which, as to colouring, cannot well be separated in description from blending into each other,) at first darkly barred on both outer and inner webs towards the tips, but gradually becoming less so towards the centre, (secondaries generally,) where three or four round spots appear on the outer web only; thence the spots become more numerous, and towards the body (tertials) the bars again appear on both webs, thus in the markings balancing the primaries on the opposite side; upper tail coverts with narrow bars of blackish brown. Tail feathers twelve in number, the two outer ones pure white, third and fourth with two broad bars of dark blackish brown near the tip, fifth and sixth with three bars of the same colour. Irides golden yellow. Weight $3\frac{1}{4}$ lbs. This bird was fat and in high condition. On dissection it proved a male; its stomach was quite empty.

In the month of October last, my relation Richard Langtry, Esq., of Fort William, near Belfast, received three live specimens of the snowy owl, which were taken in the previous month of August, from a nest in the vicinity of the Moravian settlement, on the coast of Labrador. He had commissioned a person to procure for him there living specimens of the Gyr falcon, for which the owls were mistaken. These nestlings were at the time covered only with down, and were so young that it was at first feared they would not survive until the arrival of the vessel in London. Due care was however taken of them: upwards of 700 mice, procured by an Esquimaux for the occasion, were stowed in the vessel for their support; when these were consumed, reindeers' flesh was given them; and

when the vessel came near soundings, they were supplied with sea-gulls caught upon baited hooks. An examination of these individuals has enabled me to correct an error which appears in some of the best ornithological works respecting the plumage of the snowy owl in the first year. This error seems in part, at least, to have originated with Bullock, who states, but not from personal observation, that the young birds which are seen in the Shetland Islands flying about with their parents are brown at the end of summer. Temminck also remarks, that "*les jeunes, au sortir du nid, sont couverts d'un duvet brun; les premières plumes sont aussi d'un brun clair**." Audubon observes, "I have shot specimens, which were, as I thought, so young as to be nearly of a uniform light brown tint, and which puzzled me for several years, as I had at first conceived them to be of a different species†." On arrival, when they were in good condition, the birds under consideration were as follows: One much smaller than the others, and presumed to be a male, was considerably whiter than the specimen shot in a wild state, and whose plumage has just been described, but displayed two markings which the other does not possess: the back of the head where it joins the body being blackish brown, and another patch of this colour on the body just before the carpal joint of the wing. The supposed females, which are much larger than the last-mentioned, differ exceedingly from it in markings. They have the facial plumage or that within the disk, the throat, body beneath the wings, under surface of the latter, and the legs and toes pure white. The plumage of the head from the disk posteriorly, back, upper side of wings, and whole under plumage between the folded wings presents as much of a blackish brown colour as of white, the former being disposed in the same manner as described in the specimen with which this communication is commenced; but the bars and other dark markings are so broad as to occupy equal space with the white or "ground" colour.

As immature, and especially the young birds of the year, generally wander further than those which have attained maturity from their native domicile, it has hitherto appeared

* *Man. Orn. Eur.* t. i. p. 82.

† *Orn. Biog.* vol. ii. p. 136.

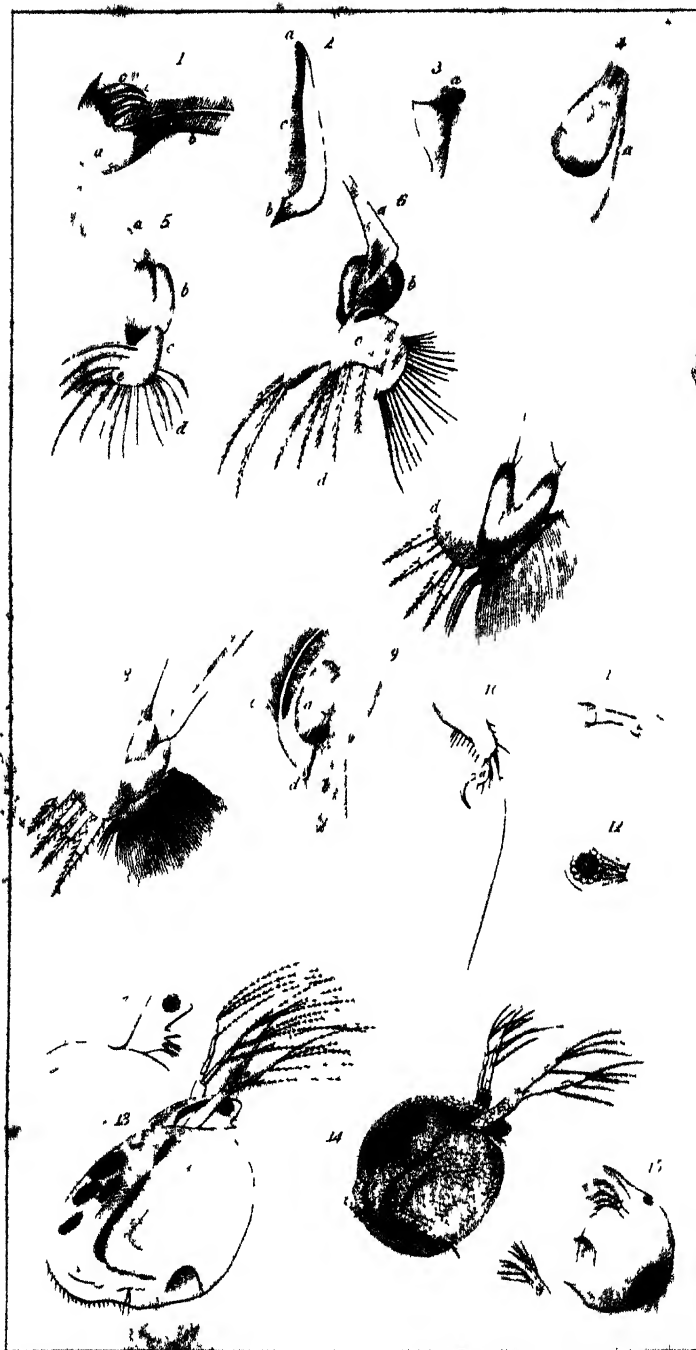
singular to me that none of the specimens of the snowy owl obtained in so southern a limit of their flight as England and Ireland, should be in the garb which is described previous to the first moult; but the plumage exhibited by these Labrador birds satisfies me, that the young of the snowy owl, like the immature individuals of many other species, do scatter themselves more widely than the adults.

The bird shot at Scrabo I have no doubt was a nestling in the summer of 1837. The individual figured by Mr. Selby* is also less white than Mr. Langtry's male bird, and if belonging to the same sex I should consider it a bird of the first year. Of two other individuals, male and female, recorded by Mr. Selby to have been killed in Northumberland in 1823, the latter was, from the number of black bars and spots, considered by that gentleman to be a young bird, but no opinion on the age of the male is offered; he is however stated to have been much whiter than the female, a circumstance which, as we have seen, does not militate against his also being a young bird of the year. Of the other specimens killed in England I have not seen such detailed descriptions as enable me to judge of their age from comparison with the Labrador birds; nor, in consequence of its sex being unknown, can a satisfactory opinion be offered on the first snowy owl recorded to have been obtained in Ireland. (Zool. Proc. 1835, p. 78.) Were the sex of the individuals known, we should probably find that the greater number of these noble birds which have wandered to the British Islands have been the young in the plumage of the first year.

It is thought desirable to add the following notice of the habits of these owls reared from the nest, as compared chiefly with those of Dr. Neill's bird†, procured when full grown. The male and one female specimen now in Mr. Langtry's possession are wild, and sometimes fast for one or two days though food is within their reach. They are chiefly fed on the heads of poultry, wild fowl, and rabbits, but mice and rats are preferred, as are also sea gulls; from these birds no feathers have to be plucked, as the owls very efficiently render this

* Ill. Brit. Orn. pl. 23.

† See Naturalist's Library: British Birds, Part I. p. 307.



service for themselves. The heads of plaice (*Platessa vulgaris*) several times offered them were refused, and being forced down their throats were instantly ejected. Castings of the indigestible portions of their food are regularly thrown up. Although the female is very partial to washing, the male has never been known to wash himself. Their usual cry is a long-drawn scream, but frequently they keep a low purring noise like a cat, and the male bird, when chased to his annoyance, utters a sound like coo-coo-coo (described by Dr. Neill as "cuckoo.").

The third individual, a female, is very different from the others, in being somewhat playful and quite familiar even with strangers. Live rats turned out to her have been invariably captured within a very short time. In the few instances where I have seen dead prey seized, the four claws were used*. Standing about a pace distant from this bird on one occasion when she was at liberty, and during bright sunshine, it was interesting to observe the contraction of the pupil of the eye, which was particularly conspicuous from contrast with the immense golden irides. When attracted by larks which were singing at a great elevation and distance, the pupil, from the ordinary size, adapted to near objects, instantly diminished to its minimum or half the ordinary diameter; and again when the sight was directed to birds at less distance, its diminution varied accordingly. The other two owls are not in the least affected by bright sunshine; and from their observing birds passing at a great height in the air, or as expressed to me "almost in the clouds," they are considered to see as far as a golden eagle, their companion in captivity.

**XXVI.—The Natural History of the British Entomostraca,
No. V. By WILLIAM BAIRD, Surgeon, H.C.S., &c.**

[With a Plate.]

(Continued from Mag. Zool. and Bot. vol. ii. p. 412.)

DAPHNIA.

Anatomy.—The body of the insect is composed of two parts very distinct from each other; the one much smaller than the

* See observation to the contrary in the last-cited work, p. 310.

other, forming the head ; the other, much larger, being the body properly so called, or abdomen. This soft body is contained within a very slender and delicate shell, the part covering the head being much harder than the other parts and prolonged underneath into a considerable sized beak. The valves, which inclose between them the abdomen, are in most of the species perfectly smooth round their circumference, but on the middle are marked with deep crossed lines, forming a mesh work, or as Schæffer describes it, are shagreened like the skin of the shark. They are open on the anterior margin, and along the posterior extremity as far as the tail, but have no hinge, being, as Goeze says, simply soldered together, though Schæffer asserts that the animal can open and shut them at pleasure. In some species these valves are prolonged posteriorly to a point forming the tail, which at some periods of their growth, and in some varieties, is very long, in others very short, and in some altogether wanting. In the head we distinguish the following parts : beak, antennæ, eye, rami, brain, mouth, and part of the digestive canal. In the body we distinguish part of the digestive canal, the body of the animal itself, heart, legs, and organs of generation. The beak is a prolongation of the hard covering of the head, and is asserted by Swammerdam to be the mouth of the animal, by means of which, being pointed, it sucks up its food. Both DeGeer and Schæffer however pointed out the erroneous nature of this assertion, and later writers, such as Jurine and Straus, have still more clearly shown it to be wrong. At the extremity of this beak, and a little underneath it, we see two small projecting organs, which are the antennæ. Schæffer, who is perhaps the first person that has noticed these, considered them as palpi, by means of which the insect distinguished food proper for itself. Jurine calls them "barbillons," but Straus considers them as being the true antennæ of the insect, though he says they do not seem to possess any voluntary motion. In the female they are extremely small, and from being much larger in the male, Muller, who does not seem to have observed them in the female at all, considered them as the male organs of generation. Jurine describes them very particularly in the male ; he calls them "harpons" (Plate ix. fig. 11), says they occupy the

place of the "barbillons" of the female, and are each composed of four rings; the first of which is very long, a little arched, and has at its extremity a "talon" from which issue two stiff hairs. The second and third are very small, whilst the fourth is a long horny hook. They seem to assist the first pair of feet in the act of copulation. The eye (plate ix. fig. 12.) is a spherical body contained in an infundibuliform tube, allowing of a semi-rotatory motion upon its centre, and is furnished with twenty crystallines according to Straus, which are limpid, and when isolated are each pear-shaped. Swammerdam asserted that there were two eyes, which seemed to be joined together, and several authors have adopted the same opinion. Schaeffer however says there is only one, and Muller and DeGeer repeat this, an opinion which has also been adopted and proved correct by Straus and Jurine. Eichhorn, as quoted by Straus, asserts that the eye is the stomach of the insect! On each side upon the base of the head are inserted the rami or arms. They consist each of a single joint at the base, dividing into two branches. This first joint is slightly conical, of the length of the head, and very moveable at the base, by means of a joint which unites it to the body and facilitates its motions in every direction. The posterior branch of each is divided into four articulations, the first being very short: the other is divided into three. Both branches are furnished with several long filaments or setæ, the posterior branch having none on the two first joints, one at the extremity of the third, and three at the extremity of the fourth. The anterior branch has one at the extremity of each of the first two joints, and three at the extremity of the third. These filaments in some of the species, such as the *Pulex*, &c. are beautifully feathered or plumose, and are each of them composed of three moveable joints, which, as DeGeer says, augment their flexibility. Swammerdam calls these organs the arms, and describes their motion very particularly, which he says is three-fold: *rectilinear*, up and down, and to each side; *unequal*, keeping the insect now at the bottom and then again at the top of the water, which sort of motion he compares to the flight of a sparrow; and *gyratory*, by which the insect moves itself in a circular manner. DeGeer also calls them arms, but Muller, and most

other naturalists after him, call them antennæ. Jurine, however, calls them "bras ramifiés," and Straus, considering them very justly as the chief or almost only organs of locomotion, and acting as it were as fins, calls them *rami*, or *rames branchues*: they are in fact, he says, a first pair of feet, and act as such; as it is by means of these organs alone that the insect moves, the other feet not serving at all for that purpose.

The brain, or first ganglion of the nervous system, is situated near the eye, and is composed of two lobes, from the superior anterior commissure of which we see, going off to the eye, the optic nerve. The mouth is of a rather complicated structure, is situated near the junction of the head and body, near the base of the beak, and consists, according to Straus, who has given the most correct account of this organ, of a "labre" or lip, two mandibles, and one pair of jaws. The "labre" or lip (plate ix. fig. 3.) consists of a flattish body, strongly compressed at the sides, and has at its extremity a large lobule (*a*). It is fixed to the posterior part of the base of the beak, is very moveable upon its antero-superior angle, and admits of a considerable separation. The mandibles (plate ix. fig. 2.) are very strong, and consist each of a pretty broad plate, which at its superior extremity is in form of a narrow point (*a*), and articulates there with the body. It descends from thence vertically to the mouth, its inferior extremity being curved sharply inwards, so as to penetrate into the mouth between the labre and corresponding jaw, and terminating in a sharp, simple, cutting edge (*b*), which has neither teeth nor triturating surface, and is quite free and unattached. These mandibles are not provided with either palpi or branchiæ, but are quite naked, and are moved by two muscles; an abductor which moves them upon themselves from within outwards, and an adductor (*c*) which brings them back to their first position, and at the same time bringing them nearer each to the other. The jaws (plate ix. fig. 1.) consist each of a strong body (*a*), somewhat in the form of a disc, or rounded on the posterior surface and a little flattened on the sides, which terminates in four strong, horny spines (*c c*), three of which are prolonged into hooks, which are strongly curved

forwards and inwards, and a prolongation or neck which is somewhat hollowed out into a gutter (*b*), and articulates by means of it with the "labre" or lip. These parts seem to be almost constantly in motion, as if the animal were perpetually employed in eating. Jurine describes these organs somewhat differently from Straus, and his figures also vary a good deal from those of this latter author. The "labre" or lip he calls "sou-pape;" and the jaws, though Straus denies his having seen them at all, are, I suspect, what he calls "barbillons," which he says consist of four rings, terminating in four filaments. Their use is, he says, to push into the "sou-pape" the bodies which ought to enter as aliment. The mouth, as I have already stated, was placed by Swammerdam at the extremity of the beak, an opinion adopted also by Ledermüller. Schæffer, however, pointed out this error, and showed its real situation, and DeGeer also pointed out its true place. Schæffer describes the two mandibles, and fancied he also saw two lips, but could not make them out distinctly, from the smallness of the shell. Part of the digestive canal is also situated in the head, and part in the body. It commences immediately behind the mouth in the form of an œsophagus, which is short, narrow, slightly curved, and stretches obliquely forwards and upwards, and terminates immediately behind the brain, in the stomach.

The stomach is in form of a large vessel, diminishing slightly in diameter from before, behind, and is curved somewhat in the shape of an ξ , or a figure 3 reversed, as described by Schæffer. It runs almost all the length of the insect, opening by the anus between the two first dentated arches of the posterior part of the last segment of the body. Immediately behind the eye, near the cardiac extremity of the stomach, we see two vessels, curved upwards, the arch turned towards the eye: these are described by Schæffer, who considers them as organs for furnishing the necessary juices for the nourishment of the body. DeGeer says they resemble cæca. Jurine supposes them to be organs proper for furnishing a juice destined to perfect digestion. Straus at first considered them as such also, but upon more mature examination at length concluded them to be really cæca. The body of the animal,

or abdomen, is quite free and unattached within the valves of the shell. It is slender and long, and is divided, according to Straus, into eight segments, the first of which is the largest, and is the only one which is attached to the valves. At the second segment the abdomen suddenly diminishes in vertical diameter, sinking down and leaving above a strong projection, formed by the first segment. From this projection, throughout the rest of its extent, the body is unattached to the shell, and leaves a vacant space between it and the edge of the valves, into which the insect deposits the eggs after laying them, and where they remain till hatched and ready to be launched into the world. The seventh segment is provided with two filaments, which have an articulation about the middle of their length, like those of the rami. In the last segment we perceive two dentated arches, between which is situate the anus. Beyond this it contracts in size, and terminates in two horny hooks, the last of which is the longest. The whole of the body, except the first segment, as I have already said, is free and unattached, and the insect can extend it beyond the valves at pleasure, the two hooks at its extremity serving well for enabling it to clear the interior of the valves. It seems also to clear the feet from any particles of mud or dust adhering to them, and Schæffer thinks it may also assist in bringing before the mouth objects of food. He says, also, that perhaps the motions of the insect are partly regulated by the strokes of this body or tail, as he calls it, and certainly it is in almost constant motion when the insect swims. On the back of the insect, in the first segment of the body, we see an ovoid-shaped vesicle, possessed of very rapid contractions; this is the heart (plate ix. fig. 4.) According to Jurine, there springs from its anterior extremity an arterial vessel (*a*), which contracts in an opposite manner to the heart itself, curves immediately from its origin, and goes backwards, following the direction of the intestinal canal. Gruithuisen describes the heart and circulation at greater length. He makes two hearts, one venous, the other arterial: the venous supplies the intestines and other parts of the body with blood; the arterial supplies the head and parts connected with it, its branches making the circuit of the shell

on the anterior edge, and collecting near the posterior inferior part into one large trunk, which runs along the back of the shell, and returns to the arterial heart again. The legs are five pairs, all differing in many respects from each other, and serving a different purpose than as organs of locomotion. The first pair (plate ix. fig. 5.) are the smallest and most simple of construction, and are situated immediately behind the mouth, being inserted into the body of the insect by the first joint (*a*), which is long and nearly cylindrical. It has four joints; the second being in form of a large vesicle (*b*); the third joint is fixed to the inferior part of the vesicle (*c*), is nearly triangular, compressed, and furnished at the inferior edge with ten long needles (*d*), situated all on the same plane, like the teeth of a comb. Attached to one corner of this third joint is an appendix (*e*), small, and terminated by a small spine, accompanied with a needle similar to those of the preceding joint; this is called a fourth joint by Straus. The second pair (fig. 6.) are larger than the first, and are articulated to the body a little behind them; the second joint (*b*) or vesicle is more heart-shaped than in the first pair, and the third joint (*c*) is much flatter. It is a slender plate, quadrilateral, attached by its upper edge to the preceding joint, and carrying inferiorly five strong plumose needles (*d*). The appendix to the third joint (*e*) is larger than the corresponding one in the first pair, and is terminated by two long spines. On the anterior edge of the third joint we see attached to it a slender, semicircular-shaped branchial plate (*f*), which has on its free unattached edge a row of twenty needles, arranged like the teeth of a comb, the last of which is the longest. In the third pair (fig. 7.), the first and second joints (*a* & *b*) are much the same, but larger than those of the preceding pair. The branchial plate (*c*) is attached to the external face of the second joint; is larger and longer than in the preceding pair, having seventy-six filaments on its free edge; and has at its posterior extremity a small ovular appendix of the same nature as the branchia, and terminated by four branchial filaments. The third joint (*d*) is attached to the internal edge of the second; it is a large, almost square plate, and sends forth from its posterior border four flat, plumose

digitations or spines. The fourth pair (fig. 8.) is very similar to, but rather smaller than, the third, and has only sixty-five branchial filaments. The fifth pair (fig. 9.) differ in many respects from the four preceding ones: the first joint is much the same as in the other feet, but the second, or vesicle (*a*), is kidney-shaped instead of heart-shaped. From this joint, and inferior edge of the first, arises an elongated plate (*b*), which has no filets. Behind this plate arises also from the second joint another (*c*), very short and broad, arched upwards, and terminating above in a flat, plumose, or rather ciliated prolongation. Inferiorly it terminates by a small moveable joint (*d*) having a long needle directed downwards, without cilia. Jurine says this last pair of feet are not inserted into the body of the insect, but the one is confounded with the other on the opposite side; the junction of the two forming the commencement of a gutter or canal, which is prolonged along the immediate attachment of the anterior feet to the mouth, where it terminates. These five pairs of feet are in almost constant motion, even when the animal is still and at rest, and their use at such times is to communicate an undulatory motion to the water, from one pair to another; thus establishing a current which enters the shell by the anterior part, carrying the molecules, &c. in the water to the posterior part, where the gutter commences, and there being driven by the vermicular motion back again to the anterior extremity of the canal or mouth. None of these feet are used for locomotion. The first and second pairs according to Straus are used by the insect for prehension. According to Jurine, the chief action of the first pair is to direct the alimentary particles brought up by the current of water along the canal above-described, into the mouth. When the mouth is opened, says the same author, to receive the food, the motion of all the feet except this first pair ceases, but in them, on the contrary, is then accelerated. The grand use of the third and fourth pairs is for respiration, being adapted for that purpose by their branchial plates, which, as DeGeer had already observed, serve the same purpose to these insects as the gills of crabs, certain aquatic insects and larvæ, fishes, &c. The second joints of these feet, which I have above described as heart-shaped vesicles, were con-

sidered by Schæffer as pockets filled with a liquid destined for the reproduction of the shell at each moulting. This opinion, however, has never been verified by any succeeding observer. Till Jurine and Straus described these insects, the number of the pairs of feet even seemed to be undetermined. Joblot says he believes there are three pairs. Schæffer says, there are one or two pairs more. Muller describes five pairs in *Daphnia Pulex* (*pennata*), but four only in *longispina*. All the species however have five pairs. In the male, the first pair of feet (plate ix. fig. 10.) differ considerably from the corresponding pair in the female. The appendix to the third joint (*a*) (the fourth joint of Straus,) is terminated by a strong claw, curved strongly outwards; and the last bristle of the third joint is much elongated, nearly the length of the body, and floats outside the shell. Jurine describes this pair of feet very particularly, and shows the use of them to be the same as the hinge-joint antennæ in the male *Cyclops*; viz. for seizing and retaining hold of the female during the act of copulation, the male introducing them along with the "harpons" or antennæ, into the interior of the shell of the female, and grasping her feet.

Organs of Generation.—The male organs have never been discovered, Muller having mistaken the antennæ for them; neither have the female organs been observed, with the exception of the ovaries. That they reside in the lower portion of the body appears most probable, from the description I have already given of the method of copulation as observed by Jurine. Straus thinks they have no external organs at all, but that the male simply injects the semen under the valves of the female, from which it introduces itself into the ovaries. The ovaries are placed along the sides of the abdomen, as in *Cyclops*, and show their situation by the matter of the eggs in the shape of small round pellucid globules. These make their appearance in the young insect after the third moulting; and gradually after that increase in size, lose their transparency, become continuous, and form a dark mass on the outer edge of the intestine, partly globular and partly elongated. At the sixth segment of the body the ovary communicates with the open space on the back of the insect, already

described, and immediately after the fourth moulting we see the eggs already laid and deposited in this space, where they remain till fully hatched.

Species.

1. *Daphnia Pulex*. Valvulis longe caudatis; capite magno; ramis plumosis; segmente corporis sexto quatuor lobulis instructo.

Hab. Ponds and ditches. Common.

Synonyms. *Pulex arborescens*, Swammerdam, *Hist. Insect. Generalis*, p. 76. tab. 1. fig. a, b, c, 1669.—*Vermes minimi rubri*, Merrett, *Pinar Rer. Nat. Britan.* p. 207, 1677.—*Animaletti aquatici*, Redi, *Osservazioni*, tab. 16. fig. 5, 1681. Redi, *Opere*, vol. ii. tav. 16. fig. 5, 1687.—*Pulex arborescens*, Swammerdam, *Biblia Naturæ*, p. 86. tab. 31. fig. 1. 3, 1737. Bradley, *Philosoph. Account of Works of Nat.* p. 202. pl. 25. fig. 5, 1739.—*Monoculus Pulex arborescens*, Linnæus, *Syst. Nat. edit.* 4. p. 96, 1744.—*Puceron branchu*, Trembley, *Mem. pour servir à l'Histoire d'un genre de Polypes d'eau douce*, p. 92. pl. 6. fig. 3. p. and fig. 11, 1744.—*Monoculus pulex arborescens*, Linnæus, *Fauna Suecica*, p. 344, 1746.—*Water Flea with branched horns*, Baker, *Emp. for Micros.* p. 302. pl. 12. fig. 14, 1753.—*Pou aquatique**, Joblot, *Observ. d'Hist. Nat. &c. tom. i. part 2.* p. 105. pl. 13. fig. P. Q. R, 1754.—*Geschwantzer-zackiger Wasserfloh*, Schæffer, *Die grun. arm. Polyp. &c. tab. 1.* fig. 1—8, 1755.—*Monoculus Pulex*, Poda, *Insect. Mus. Græcens.* p. 124, 1761. Ledermüller, *Mikroskopischen Gemuths- und Augen-ergötzung*, p. 146. tab. 75. fig. 2, 1763.—*Le Perroquet d'eau*, Geoffroi, *Hist. Abrég. des Insectes*, t. ii. p. 655. no. 1, 1764.—*Monoculus Pulex*, Muller, *Faun. Insect. Fridrichsdalens.* p. 95, 1764.—*Branchipus conchiformis primus*, Schæffer, *Element. Entom.* t. 29. fig. 3, 4, 1766. Goeze, *Naturforscher*, part 7, 1775.—*Daphne Pulex*, Muller, *Zool. Dan. Prod.* p. 199. no. 2400, 1776.—*Monoculus Pulex ramosus*, De Geer, *Mem. pour serv. &c. t. vii. p. 442. pl. 27. fig. 1—4*, 1778.—*Monoculus Pulex*, Blumenbach, *Handbuch der Naturgeschichte*, p. 399, 1779. Eichhorn, *Beyträge zur Naturgeschichte*, &c. p. 51. t. 5. fig. H, 1781.—*Daphnia pennata*, Muller, *Entomostraca*, pl. 12. fig. 4—7, 1785.—*Monoculus Pulex*, Manuel, *Encyc. Method. Hist. Nat. t. vii. p. 722. no. 15. pl. 265. fig. 1—4*, 1792. Fabricius, *Entomol. System*, tom. ii. p. 491, 1793. Latreille, *Hist. Nat. gen. et part. des Crust. &c. t. iv. p. 223*, 1802. *Encyclopediæ Britannica*, art. *Entomology*, 1810.—*Daphnia Pulex*, Lamarck, *Hist. Nat. des Anim. sans Vertèb. t. v. p. 126. no. 1*, 1818. Samouelle's *British Insects*, p. 80, 1819.—*Monoculus Pulex*, Jurine, *Hist. des Monoc. &c. p. 85. pl. 8. fig. 1, 2. pl. 11. fig. 1, 3, 5*, 1820.—*Daphnia Pulex*, Straus, *Mem. du Mus. d'Hist. Nat. tom. v. pl. 29*, 1821. Desmarest, *Consid. Gen. sur les Crust. p. 372. pl. 54. fig. 3, 4*, 1825.

* This is quoted by Straus as identical with his *D. macrocopus*.

The *Daphnia longispina* of Muller (who quotes Schæffer, pl. ii. fig. 1.) and many other succeeding authors, amongst others Ramdohr, is merely a variety of *D. Pulex*, or rather the same insect in a less advanced stage of growth. The *D. magna* of Straus, pl. xxix. f. 21, 22, is also a mere variety of the *Pulex*, as I have found them both together in considerable numbers, and running into each other.

The shell is quite transparent in general, though sometimes reddish coloured. The extremity of the valves terminates in a long spinous tail. Head large, beak sharp-pointed, rami beautifully plumose. The sixth segment of the body has four projections issuing from it, the first being prolonged and curved upwards. The tail of the shell varies much in length, sometimes being short and blunt, which is the *D. pennata* of Muller, the *D. Pulex* of Straus; at others it is long and pointed, and in this state it is the *D. longispina* of these authors. Jurine has, I think, satisfactorily shown these to be mere varieties, the length of the tail varying according to age. In the young it is always long, and becomes shorter as the insect advances in age. The male is much smaller than the female, and has the antennae much longer, as already described.

II. *Daphnia vetula* (plate ix. fig. 13.). Valvulis non caudatis, ramis plumosis, segmento sexto corporis non instructo lobulis.

Hab. Ponds and ditches, common.

Synonyms. Ungeschwanzter-zackiger Wasserfloh. Schæffer, p. 229. pl. 1. fig. 9, 1755.—*Daphne vetula*. Muller, Zool. Dan. Prod. p. 199. no. 2399, 1776.—Sulzer, Abgekürzte Geschichte der Insecten, p. 266. pl. 30. fig. 10. e, 1776.—Mon. exspinosus. De Geer, tom. vii. p. 457. pl. 27. fig. 9—11, 1778.—*Daphnia Sima*. Muller, Entomostraca, pl. 12. fig. 11—12, 1785.—Mon. Simus. Linnæus, Syst. Nat. 3000. no. 25, 1788.—Mon. Simus. Manuel, Encyc. Méth. t. vii. p. 723. no. 18, 1792.—Mon. lævis. Fabricius, Ent. Syst. t. ii. p. 492, 1793.—*Daphnia Sima*. Latreille, Hist. Nat. gen. et part. t. iv. p. 288, 1802.—*Daphnia Sima*. Bosc. Hist. Nat. Crust., &c. t. ii. p. 283, 1802.—Mon. Conchaceus. Donovan's Nat. Hist. of Brit. Ins. vol. i. p. 15. pl. 5. fig. 1, 1802.—*Daphnia Sima*. Ramdohr Beyträge, &c., 1805.—*D. Sima*. Gruithuisen, Nova Acta Phys. Med. Acad. Cæsar. Natur. Curios. vol. xiv. part 1st. p. 399. pl. 24. fig. 1—6, 1815.—Mon. Sima. Jurine, p. 129. pl. 12. fig. 1—2, 1820.—*Daphnia Vetula*. Straus, t. v. pl. 29. fig. 25—6, 1821.—*Daphnia Sima*. Desmarest, p. 373, 1825.

In this species the valves of the shell are without the spi-

nous tail of the preceding, being rounded and slightly serrated on the inferior margin. The rami are plumose, but not so decidedly as in the preceding species. The head is obtuse, much smaller than in *Pulex*, and the beak less projecting. The sixth segment of the body has one or two slight projections upon it, but is not provided with the lobules of the *Pulex*. The shell is smooth and transparent. It is smaller than the preceding species.

III. *Daphnia reticulata* (plate ix. fig. 14.). Valvulis rotundatis, reticulatis, brevi-caudatis, capite parvo.

Hab. Ponds and ditches round London, ditch near Surrey Zoological Gardens, &c.

Syn. *Daphnia quadrangula*. Muller, *Entomostraca*, 1785.—Mon. quadrangula. Linnaeus, *Syst. Nat.* no. 24. 2999, 1788.—Mon. quadrangularis. Manuel, *Encyc. Méth. t. vii. p. 723. no. 17. pl. 265. fig. 8, 9.* 1792.—Mon. quadrangulus. Fabricius, *Ent. Syst. t. ii. p. 492*, 1793.—*Daphnia quadrangula*. Latreille, *p. 227. t. iv., 1802.*—*Daphnia rotunda?* Straus, *op. cit.*, 1821.—Mon. reticulatus. Jurine, *p. 139. pl. 14. fig. 3. 4.* 1820.—*Daphnia reticulata*. Desmarest, *p. 374*, 1825.

The valves of the shell in this species are nearly rounded, reticulated, provided with a short tail. The head is small and has no beak; the rami are not plumose. The figures of *D. quadrangula*, Muller; *D. rotunda*, Straus; and *Mon. reticulatus*, Jurine, all differ somewhat in appearance; but I have seen this species frequently assume the appearance of Muller's figure as well as that of Straus, and I have no doubt of all these being the same species.

IV. *Daphnia cornuta* (plate ix. fig. 15.). Valvulis convexis, curti-caudatis, capite longe rostrato, ramis curtis.

Hab. New River, London.

Syn. Monoc. cornutus. Jurine, *p. 142. pl. 14. fig. 8. 9. 10*, 1820.—*Daphnia cornuta*. Desmarest, *p. 375*, 1825.

This little species is provided with a very long beak, which is slightly curved. The anterior, inferior angle of the shell is prolonged into a short tail. The rami are very short, scarcely the length of the beak. In many respects it bears a strong resemblance to a *Lynceus*, and seems to be the connecting link between the two genera.

XXVII.—*Notices of British Fungi.* By the Rev. M. J. BERKELEY, M.A., F.L.S.

[With Plates.]

Continued from p. 208.

108. *Leptostroma juncinum*, Fr. ! Scler. Suec. n. 330. Berk. Brit. Fung. Fasc. 3. n. 197. On dead stems of *Juncus conglomeratus*. Thringstone, Leic. Churchill Babington, Esq., King's Cliffe.

109. *Diderma contextum*, Pers., Obs. Myc. 1. p. 89. Ditm. in St. Deutsch. Fl. t. 39. On grass, fern, &c. Wothorpe. Norths.

110. *Didymium melanopus*, Fr., Syst. Myc. v. 3. p. 114. β . *Physarum Clavus*, A. and S. p. 96. t. 2. fig. 2. On moss. Apethorpe, Norths.

111. *Didymium xanthopus*, Fr., l. c. p. 120. *Cionium xanthopus*, Ditm. in St. Deutsch. Fl. t. 43. On ivy leaves, &c. King's Cliffe.

112. *Diachea elegans*, Fr. l. c. p. 156. *Trichia leucopodia*, Bull. t. 502. f. 2. On living leaves of *Convallaria majalis*, &c. King's Cliffe.

113. *Stemonitis typhoides*, Dec., Fl. Fr. vol. ii. p. 257. Ehr. Sylv. Myc. Ber. fig. 7. On rotten wood. Apethorpe.

114. *Stemonitis arcyrioides*, Sommerf., Fr. l. c. p. 162. On dead laurel leaves, &c. Apethorpe, Norths. Clifton, Notts.

115. *Arcyria ochroleuca*, Fr. l. c. p. 181. *A. silacea*, Ditm. l. c. t. 8. On rotten wood. Collyweston, Norths. This species has, I believe, been found in Scotland by Dr. Dickson.

116. ASCOTRICHIA, n. g. Peridium thin, at length bursting, clothed with dark, sub-pellucid, even, obscurely jointed hairs. Sporidia simple, contained in linear asci. Superficial at length free, or only supported by the investing thallus; black.

Ascotricha chartarum. On white printed paper in a deal candle-box. King's Cliffe. The present plant is one of considerable interest, and not referable to any genus at present established. When submitted to the microscope, if the asci be distinctly seen, a hasty or superficial examination might pronounce it a *Sphaeria* of the division *Villosæ*; or on the other hand, if the asci were not observed, a *Chatomium*. A more

mature examination will show that it belongs to the *Perisporiaceæ*, being allied on the one hand to *Antennaria* and on the other to *Chaetomium*, and that its relation to *Sphaeria* is, if I mistake not, merely one of analogy. With *Chaetomium* it agrees in most points, but the sporidia are not irregularly distributed in the gelatinous contents of the peridium, but are contained in distinct though highly transparent asci. The hairs are of a very different structure from those in *Chaetomium elatum*, where they are curiously scabrous with minute rough points arranged in transverse lines, and nearly opaque; in the present plant perfectly even and far more pellucid, though dark. A more important circumstance, perhaps, is the freeness of the peridia, in which point some approach is made in the genus *Antennaria*, which again presents a moniliform arrangement of the sporidia. The analysis given of *Antennaria cellaris* by Dr. Greville is exceedingly correct, and it will be seen that there is not the slightest trace of asci. Fries, however, whose acute observation nothing escapes, directs our attention to the apparently moniliform arrangement of the sporidia in *Sphaeria Peziza*, which torulous appearance arises from the sporidia bulging out in consequence of the slenderness of the asci; and to this hint I have to acknowledge the being able to refer to its proper place the present production, which at first somewhat puzzled me. In the instance before us the asci are distinctly developed, though difficult to see, in consequence of their great transparency; but attentive observation will show them as distinct as represented in the figure. Indeed, except in old individuals, they are always to be seen with a careful adjustment. It is scarcely needful to add, that in the species of *Sphaeria* of the division *Villosæ* the sporidia are always more or less distinctly septate, and altogether very different from those of the plant before us. The branching of the hairs which invest the peridia is very curious, and very much resembles that of the vine as explained by Turpin (See Ann. des Sc. Nat. n. s. 1. p. 225).

At first appearing under the form of a minute branched *Sporotrichum*, interspersed with globose brownish conidia. As it advances in growth globose black peridia become visible among the flocci, clothed with and supported by alternately

branched obscurely jointed filaments (thallus), the branches of which generally form an acute angle with the stem. The ramification of these is very peculiar, the stem and main shaft of each subdivision being almost constantly abbreviated and surmounted by the branchlet given off near its apex; this again is often abbreviated and another branchlet given off, which again surpasses it, and occasionally the same circumstance takes place a third time. The apices are clavate and colourless; the rest of the filaments, when viewed by transmitted light, brown, even, and pellucid; a few globose conidia are usually attached to them. The peridium is thin, black to the naked eye, of an olive brown under the microscope, filled with a mass of linear extremely transparent asci, each containing a single row of broadly elliptic chocolate sporidia. These have a paler border; sometimes the colour entirely vanishes either from age or abortion, and there is only a minute globose nucleus, or more probably a vesicle of air, in the centre; occasionally they become so transparent that the globular bodies alone are visible. After the peridia burst, several are frequently collected together into an irregular linear body, which consists principally of the conglomerated sporidia.

TAB. VII. fig. 8. *a*, *Ascotricha chartarum*, nat. size; *b*, peridia, a portion of the filaments only being represented, that their ramification may be more easily seen; *c*, peridium, artificially ruptured; *d*, portion of thallus, with conidia; *e*, asci; *f*, sporidia: all more or less magnified.

117. *Isaria arachnophila*, Ditm., l. c. t. 55. On a dead spider at the foot of a sallow, Collyweston, Norths. The sporidia are distinctly arranged in moniliform threads exactly as in *Aspergillus glaucus* or *albus*, of one of which species, or possibly of some *Penicillium*, I strongly suspect it to be a state. My specimen exactly accords with Ditmar's figure.

118. *Isaria intricata*, Fr., Syst. Myc. vol. iii. p. 278. On various dead Fungi, as *Agaricus mutabilis*, &c., Apethorpe, King's Cliffe. Some specimens belonged to the form described by Fries, others to *Isaria subsimplex* of Schumacher.

*119. *Anthina flammea*, Fr., Syst. Myc. vol. iii. p. 283. Amongst leaves of oak, beech, hazel, bilberry, &c., King's Cliffe, Norths.; Sherwood Forest, Notts.

120. *Syzygites megalocarpus*, Ehr. Verhandl. Naturf. Freund.

vol. i. p. 98; Fr. Syst. Myc. vol. iii. p. 329. On decaying Agarics, King's Cliffe. The manner in which the peridiolum in this most curious production is formed after the two lateral branches unite is very remarkable. The matter contained in them is attracted on either side towards the point of junction; a partition is then thrown out behind each grumous mass, which gradually becomes more and more distinct from the parent branch; at length the common commissure becomes obsolete, and finally the central septum which consisted of the two coats of the united branches is absorbed.

121. *Myxotrichum chartarum*, Kz. Myc. Heft. ii. p. 110.; Berk. Brit. Fung. Fasc. 3. n. 207. On straw, &c. in damp places, King's Cliffe, &c.

122. *Myxotrichum deflexum*, n. s. On paper which had been wrapped round a piece of decayed hazel wood on which was *Arcyria punicea*, and on the wood itself, King's Cliffe. This species to the naked eye perfectly resembles *Myx. chartarum*; but on examination not only does it want the curved apices to the flocci, but the mode of branching is altogether different. In the one the branches form more or less acute angles with the stem; in the present species they are mostly opposite, set on at right angles and deflexed. The main threads are generally simple, and if branched not trifid and subcymose.

Forming little patches consisting of little gray downy balls. From these arise a number of radiating threads furnished with a few opposite deflexed branchlets, which decrease in size from the base upwards, so as to give the appearance of a little grove of larches. The branches have occasionally a few short acute branchlets, which are often alternate. Sporidia collected in patches about the base of the threads, oblong-elliptic.

PLATE VIII. fig. 9. *a*, *Myx. deflexum*, nat. size; *b*, a portion of one of the patches; *c*, a few of the filaments with masses of sporidia; *d*, sporidia; *e*, filaments of *Myxotrichum chartarum* from a part of a mass not producing the spiral tips.

123. *Helminthosporium Clavariarum*, Desm. in Ann. d. Sc. Nat. n. s. v. ii. tab. 2. fig. 2. On *Clavaria rugosa*, γ *grisea*, King's Cliffe.

124. *Dematium echinobotryum*, Fr. in Ind. Alph. p. 87. *Echinobotryum atrum*, Corda in St. Deutsch. Fl. fasc. 12. tab.

26. On decaying walnuts, Milton, Norths. My specimens, though tolerably abundant, were rather past maturity, but they agree with Corda's figure. His specimens were found at the bottom of an oil cask sprinkled with broken blister flies.

The discovery of this plant is interesting as confirming the general correctness of M. Corda in one of the most extraordinary of the new objects represented in his continuation of Ditmar's admirable work on *German Fungi*. I have lately met with another of these curious productions, *Hemicyphe stilboidea*, which is however clearly a species of *Mucor*, very nearly allied to *Mucor clavatus*. It is much to be regretted that he has made so many new genera on utterly insufficient grounds, and indeed that he has represented as autonomous species many mere *Mycelia*, or what is worse, decayed Fungi, or bad specimens of common species overrun with minute gelatinous Algæ. To the greater part of the sixteen productions represented in the last number, all referred to new genera, these remarks are strictly applicable. M. Corda's work is valuable as a register of various interesting forms of Fungi, but it is of little use where a correct delineation is requisite of parts differing but slightly from each other, on which the discrimination of nearly allied species depends.

125. *Macrosporium sarcinula*, n. s. On decaying orange gourds, King's Cliffe. Its first appearance is that of orbicular white downy patches consisting of suberect slightly branched threads. These soon vanish, leaving a dark olive green stratum, consisting at first of short clavate filaments with one or two septa. Their apices gradually become much incrassated, and the number of articulations increases. The septa are mostly horizontal with a few vertical ones; a few occasionally are inclined. In this state the colour is yellowish when viewed by transmitted light. The sporidia gradually assume a browner tint, become more and more distinct from the peduncle, and at length fall off, acquiring a rectangular outline, and resembling very much little corded bales, from which circumstance the name is taken. They vary greatly in size and in the number of cells. A few of the peduncles are seen amongst the sporidia, their articulations being frequently swollen above.

I am not certain whether the white filaments mentioned above properly belong to the plant.

PLATE VIII. fig. 10. *a*, *Macrosporium sarcinula*, nat. size; *b*, white filaments and infant sporidia; *c*, sporidia from a patch in which the down has vanished; *d*, same, more highly magnified; *e*, perfect sporidia; *f*, same, more highly magnified.

126. *Aspergillus alternatus*, n. s. On damp paper, King's Cliffe. Grey black. Forming little orbicular patches. Extremely minute, scarcely to be distinguished without a lens. Mycelium thin, decumbent; fertile flocci articulate, erect, or subdecumbent, branched alternately in a zigzag manner; each branch terminated by a slightly swollen receptacle which is studded with oblong subtruncate sporidia. The mode of branching is as it were annotinous, the same as that of *Ascotricha chartarum*. The habit is that of *Sporocybe*, but in structure it agrees with *Aspergillus*.

PLATE VIII. fig. 11. *a*, *Aspergillus alternatus*, nat. size; *b*, a portion magnified; *c*, the termination of one of the branches with its head of sporidia; *d*, sporidia.

127. *Botrytis citrina*, n. s. On dead branches of cherry lying upon the ground, King's Cliffe. Summer. Forming thin delicate mucedinous patches, about an inch across. Mycelium nearly white, as indeed is the whole plant at first. Fertile flocci erect, articulated, branched; branches subcymose, lemon-coloured, as well as the obovate spores.

PLATE VIII. fig. 12. *a*, a portion of the plant; *b*, upper part of one of the fertile flocci more highly magnified.

128. *Botrytis curta*, Berk. Brit. Fung. Fasc. 3. n. 209. On *Anemone nemorosa*, King's Cliffe. Distinguished from *Botrytis parasitica*, which comprises many distinct forms by its simple denticulate, not branched or scarcely branched threads. Extremely minute, at length grey brown; flocci simple, abbreviated, their tips denticulate; spores oval.

PLATE VIII. fig. 13. Flocci and spores highly magnified.

129. *Penicillium fasciculatum*, Sommerf. Fr. l. c. p. 407; Berk. Brit. Fung. Fasc. 3. n. 210. On various dead herbaceous plants, generally springing from *Sclerotium durum*, King's Cliffe, &c.

130. *Oidium chartarum*, Lk. Sp. 1. p. 124. On damp paper, King's Cliffe.

131. *Epochnium macrosporoideum*, n. s. On the decorticated portion of a decayed twig apparently of *Ribes rubrum*, King's Cliffe, August. Forming a thin slate-black stratum. Flocci transparent, perfectly colourless under the microscope, as far as I have observed not septate, very slender, effused, irregularly branched, often anastomosing at right angles. From the tips or on very short lateral branches spring subglobose or oval colourless transparent vesicles with a central nucleus; these by degrees are furnished within with obscure septa still retaining their transparency; at length they acquire when full-grown a brown hue, and are from $\frac{1}{1350}$ to $\frac{1}{2000}$ of an inch in diameter. They are then in general more or less globose, divided by septa into a few lobes, which are disposed in a radiating manner like the berries of a mulberry. Occasionally the septa appear darker than the rest of the sporidia. A few are furnished with a little apicular peduncle, but the greater part lose all traces of the point of attachment. I have sometimes seen one or two cells projecting from the otherwise globose sporidia, and in one instance two sporidia were united by means of such a process. I have little hesitation in referring the present highly curious production to the genus *Epochnium*, the circumstance of the sporidia being globose being clearly comparatively of small importance.

PLATE VIII. fig. 14. *a*, *Epochnium macrosporoideum*, nat. size; *b*, early stage of do.; *c*, a portion more advanced; *d*, sporidia; *e*, a single sporidium more highly magnified.

*132. *Sepedonium roseum*, Fr. l. c. p. 438. On *Helvella crispa*, Laxton.

133. *Xenodochus carbonarius*, Schlecht. in Linn. vol. i. p. 237. t. 3. f. 3. Upon *Uredo miniata* of the common Burnet. This very interesting addition to our Flora was found near Ashby de la Zouch by Mr. Churchill Babington. It appears to have been detected before only by Schlechtendal.

134. *Torula graminis*, Desm. n. 169. On dry leaves of large Carices, Collyweston, Norths.

135. *Cylindrosporium Ficaræ*, Berk. Brit. Fung. Fasc. 3.

n. 212. On *Ranunculus Ficaria*. Common. White, sporidia irregularly oblong, slightly curved.

136. *Uredo Artemisiæ*. Chev. Fl. Par. vol. i. p. 399; Berk. Brit. Fung. Fasc. 3. n. 235. On *Artemisia Absinthium*, King's Cliffe.

137. *Uredo pompholygodes*, Schlecht. in Linn. vol. i. p. 248; Berk. Brit. Fung. Fasc. 3. n. 236. On *Anemone nemorosa*, King's Cliffe, May. It is to be observed that *U. Ranunculacearum*, Dec., is at least in great part the same species with the present, of which *U. Anemones*, Dec. Fl. Franc. is a synonym. Consequently the species described in Eng. Fl. under the name of *U. Ranunculacearum* on Link's authority, must bear the name of *Uredo Ficariæ*, Alb. and Schwein.

XXVIII.—On the Ant Tree of Guiana (*Triplaris Americana*).

By ROBERT SCHOMBURGK, Esq.*

TRIPLARIS, LINN.

Class IX. Ord. II. Ord. Nat. POLYGONÆ, JUSS.

Flores dioici. Calyx basi tubulosus, pilosus. Flores Masc. Calyx limbo 6-partitus. Corolla 0. Stamina 9. Flores Fem. Calyx 3-partitus. Corolla 3-petala. Ovarium 3-quetrum. Styli tres. Akenium 3-quetrum, calyce aucto tectum.

T. Americana, foliis alternis, integerrimis, oblongis, acutis, nervosis; stipulis lanceolatis laceris, spicis terminalibus axillaribusque brachiatis.

Triplaris Americana, Linn. Sp. Pl. p. 130. Aubl. Guian. ii. p. 915. t. 347.—*T. Pyramidalis*, Jacq. Amer. 13. t. 173. f. 5.

A TREE from fifty to sixty feet in height; its trunk smooth, of a greyish colour; the branches erect, frequently in the form of a pyramid; leaves entire, oblong and narrow, from nine to twelve inches long, of a dark green colour; petiole dilated at the base, somewhat amplexicaule, with ochreate stipulæ, and marks at the opposite direction, as of fallen-off petioles; flowers unisexual. *Males*: calyx hairy, tubular, surrounded by a lacinated bractea, six-parted; corolla absent; stamens nine, divided in three parcels of different sizes, the large ones opposite the segments of the calyx, filaments somewhat crooked; anthers ovate, two-celled, dehiscing lengthwise. *Females*: calyx provided with the bractea, three-

* Read before the Botanical Society of London, April 6, 1838, and communicated by that Society.

parted; petals three, lanceolate; ovarium superior; styles or stigmas three; alkenia triangular, protected by the calyx; seed farinaceous.

Dr. Lindley, in his Natural System of Botany, in speaking of the geographical distribution of *Polygoneæ*, observes, "There are few parts of the world that do not acknowledge the presence of plants of this order. In Europe, Africa, North America, and Asia, they fill the ditches, hedges, and waste grounds, in the form of Docks and Persicarias; the fields, mountains, and heaths, as Sorrels and training and twining *Polygonums*; in South America and the West Indies they take the form of Coccolabas or sea-side grapes; in the Levant of Rhubarbs; and even in the desolate regions of the North Pole they are found in the shape of *Oxyria*."

The object of my description adds another instance to illustrate these remarks; the *Triplaris*, which pronounces, in its habits of growth, leaves, stipulæ, its triangular nut protected by the calyx, the farinaceous albumen, &c. its relationship to that tribe, extends from Columbia to the verge of Brazil's western boundary. The sandy banks of the inland rivers of Guiana are peopled with them; and when shrubs, stunted in growth by the poverty of the soil, scarcely reach the height of five or six feet, the *Triplaris* overtops them forty or fifty feet. The trunk is slender and grows up straight, and its erect branches form a pyramid. As already observed, it is unisexual, and the flowers of both sexes are insignificant: those of the male last only for a few days, when they dry up; this is likewise the case with the petals of the females: the segments of the calyx however continue to grow, changing in their growth from green to white and vermilion, and become so attenuated that the branched nerves are easily perceptible. In that state they are three times as large as the fruit, which is still protected by the tube of the calyx, and the whole might in appearance be resembled to a shuttlecock. The risps are dense, and the tree presents now a most elegant appearance. One unacquainted with the contrary, would consider the tree covered with white blossoms, tinged with red, among which the dark green leaves have only occasionally room to make themselves visible. The uncautious botanist, who, allured by the deceptive appearance,

should approach the tree to pluck the blossoms, would bitterly rue his attempt. The trunk and branches of the tree are hollow, like those of the trumpet tree (*Cecropia*), and provided between space and space with partitions, which answer to the position of the leaves on the outside.

These hollows are inhabited by a light brownish ant, about two to three tenths of an inch long, which inflicts the most painful bites. Its antennæ are placed near the middle of the * anterior portion of the head; mandibles triangular; peduncle of the abdomen with two rings; the anus hairy and provided with a sting or piercer (*Myrmica*, Latr., nova species). They fall upon their prey with the greatest virulence, and insert their mandibles almost instantly, as soon as they come in contact with any soft substance, emitting a whitish fluid; their bite causes swelling and itching for several days. If they find themselves captured, they attack and kill one another like the scorpions.

The Arawak Indians call the tree Jacuna, and the ant Jacuna sae; the Warrows Epouahari, the literary translation being ant tree; the Caribis Itassi; the colonists, from its growth, "long John."

The presence of the scarious stipulæ, in the form of an ochrea, is sufficient to determine the natural order to which *Triplaris* belongs; other evidences, namely, the formation of its leaves, its organs of fructification, and particularly the erect ovulum and the superior radicle, put its relationship to *Polygonæ* beyond doubt. It resembles strikingly the *Coccoloba* in the form of its petiole, and the manner in which it is attached to the stem; we have in *Coccoloba* a similar mark opposite the petiole, and those asperities which are to be found below the latter organ are likewise observable in *Triplaris*. In *Coccoloba* the calyx swells and forms a juicy berry, in *Triplaris* it becomes three times as large as the nut. In its hollow trunk and branches, and the septums of the latter; in the division of the sexes, it resembles *Cecropia*; but to these affinities in appearance but little importance can be attached.

Triplaris has received hitherto a very meagre description. Jacquin gives the representation of its fruit, and Aublet a branch; it is however evident that the flowers of the male

were described from those of the female flower: the bractea, present in both, has been completely passed over; the calyx of the male is stated to be three-parted, while it is six-parted; and the pubescence, which is present in the calyx of both sexes, has been likewise omitted; the bractea is likewise covered with hair.

River Quitaro, Lat. 2°. 50'. N., November 1837.

XXIX.—*On the Root of the Madder.* By M. DECAISNE.

IN the valuable '*Recherches Anatomiques et Physiologiques sur la Garance*,' lately published at Paris by M. Decaisne, that gentleman gives the following interesting account of the root.

The roots of the Madder or Turkey red (*Rubia tinctorum*) are of the form generally described as a *branching root*, for though undivided when young, they shortly begin to ramify, though the original shoot remains the thickest; their anatomy, which I shall proceed in few words to describe and trace through its several stages of growth, will explain their structure.

During the first days of germination, and while the plant has no other leaves than its two cotyledons, the root is simple and unbranched; its upper part, immediately below the neck, being covered with very slender fibrillæ, which closely clasp the grains of sand with which they may come in contact. If the young root be cut horizontally across at this part, it will be seen to consist, looking from the circumference to the centre, of, first, a row of extremely small cortical cells, some of which emit externally a very fine and simple prolongation, constituting the above-mentioned fibrillæ, in the same way as the epidermal tissue of leaves gives rise to hairs. After this row of cortical cells comes a thicker or thinner layer of cellular tissue, whose divisions diminish in size as they approach the centre, while the innermost part is almost confounded with the fibrous tissue which surrounds the vessels occupying the whole middle of the root. The vertical section of a young rootlet (if it may be so termed) exhibits the cortical cells arranged in nearly regular longitudinal series, slenderer than the others; then those which compose the fleshy portion in series which become more and more regular

as they advance further towards the fibrous tissue, which latter is formed of more elongated cells arranged with equal regularity. It is in this fibrous part that, more generally than elsewhere, we find cells containing crystals as well as the vessels of the latex; the latter, which I have only been able to detect in a single instance and by means of maceration, appeared to me flattened, and with swellings at regular distances. As regards the cellules which form the fibrous tissue, these are seen to be elongated and to terminate in a blunt apex; they are transparent, and have thicker partitions than those of the cellular tissue which contain the green matter, and are closely applied to one another.

The centre of the root is almost entirely formed of vessels; if examined at the same stage as in the preceding observations, these vessels will appear under the form of transparent elongated cells, generally placed end to end, and forming by their combination a sort of cylinder, placed in the centre of annulated vessels which are separated by long intervals from each other, and surrounded for its entire length by the cellular and fibrous layers formerly described; it extends a little further and below these, forming a slight projection which constitutes the *spongiole*.

In this incomplete state of organization these vessels seem to perform an office similar to that of the cellular tissue or medulla. Later, and when they have attained their perfect organization, instead of being thin and transparent, they present (on examining, when highly magnified, their horizontal section) many divisions, which are of a brighter or paler fawn colour, and in which I could clearly distinguish the cavities to which MM. De Mirbel and Hugo Mohl have lately called the attention of the curious. These belong to what are termed *punctuated vessels*, and are of uncertain diameter, with empty spaces between them. These hollow spaces or intervascular meata contain a colouring matter analogous to that of the cellular tissue; and it is probable that the *madder powder*, furnished by the central or vascular part of the root, only owes its superior quality over what is obtained from the cellular tissue, (or alburnum of the manufacturers,) to the entire absence of all foreign substances. In fact, I never observed any

crystals among the vessels, and this is the only difference I have been able to detect between the parts of the two tissues containing the colouring principle. However, the woody part, completely stripped of the surrounding cellular tissues, affords the very finest powders, according to the observations of the manufacturers in the South of France; these remarks contradicting those of M. E. Kœchlin, as will be shortly seen. I ought to state that I have cut through these vessels at different periods of growth, and never found them filled with liquid. It is they which appear, in an early stage, to produce the radicles; in fact, when examining young roots, I have often seen, after removing the cellular tissue by maceration, that the ligneous body formed of the vessels I have described, has emitted from its circumference projections more or less apparent, which afterwards by elongation produce the radicles which are already noticed.

If the root be again scrutinized when far more advanced, still its internal structure will appear to have undergone no material change, and the organization which I have described is found to be the same; the only appreciable difference consisting in a proportionate increase of the tissues, whose several layers are thickened by the addition of new rows.

The *madder root*, which was pale yellow at the earliest period of its developing, gradually acquires a deeper and deeper tinge, as takes place in age with the several parts of almost all vegetables. The same phenomenon exists in the cotyledons; for if a section of the infant stalk be made at the period when it first bursts from the seed, the cotyledons will be seen to emit a yellowish fluid, which shortly assumes a decidedly red hue.

By the above facts, it may be ascertained that, so far as depends on the arrangement of the different parts, the *root of madder* departs in no respect from the common structure of roots. No peculiar cavities, designated by the name of *reservoirs for the proper juices*, seem to exist. If the fluid which the vessels of the latex contain were in any respect unlike that which is observable in all the cells, it can be only in the fainter colour, since these are with difficulty discerned; and as to the existence of crystals in some of the cells, this is by no means

an extraordinary circumstance, as they may be frequently found in other plants.

It remains for us to see what are the phænomena that take place in the fluid that is diffused through the whole cellular tissue of the root. It has been already remarked, that the roots, which, when very young, are pale yellow, assume a much deeper hue when old. If this fluid be carefully examined, it will not appear to hold any substance in solution; and whether it escapes through the partitions of the cells or by an incision purposely made, it still seems perfectly limpid. As, however, when the root is thoroughly dried, the internal cells, though all the fluid has evaporated, still assume a yellow tint if laid to steep, it would appear that the liquid had originally possessed a solid colouring principle, though, even in this state, such is its tenuity, that the largest swellings do not allow it to be seen.

It is of course presumed in the above observations, that the different parts have been subjected to no external agency whatever, as such agency produces great changes; for instance, after having made sections, whether vertical or horizontal, of a young root, and subjected them to microscopical examination, this juice, which is so perfectly limpid in the living plant, presently becomes thick and cloudy, while its originally pale yellow tint changes to a bright rose colour. Experiments on older roots yield the same results, except that as in these cases the yellow fluid is originally much brighter, so its change to red when exposed to the air becomes proportionably intense, and instead of acquiring, as in the preceding case, a roseate tint, the result, from an orange colour, is a change to the most vivid red.

If attention be paid to the circumstances under which this red colour is obtained, which did not exist before the section of the parts, we cannot but suspect that the action of the air, which was previously excluded, is the cause more or less of this change, and an increased number of experiments confirms this opinion. In a thin layer the modifications occasioned by the external air on the yellow colour may be successively traced; the red tinge always manifesting itself first in that

part of the cellular tissue contiguous to the vessels of the latex ; next in the cells occupying the intervals of the dotted vessels in the centre of the root ; and lastly in the various parts of the cellular tissue which compose the fleshy portion, and which is the principal deposit of the yellow fluid.

It is easy to understand these phenomena in a thin layer of root, and to explain the production of the red hue in these determinate places ; the air passes most freely, and consequently with the greatest rapidity, into the part filled with vessels, the cutting open of which, at both ends, makes a free way for it, and where it meets with no obstruction from the transverse diaphragms that exist in the cellular tissue. The proper vessels situated immediately next to these, and habitually replete with liquid, and protected with very thin *parietes* through which any gas can readily take effect, will be the first to become coloured, as well as the spaces comprised between these vessels and those to which I formerly alluded ; while, lastly, the cellular tissue being composed of numerous superincumbent cellules, and thus offering many impediments to the action of the air, it is easy to perceive that the most external cellules will first receive its influence, and that in the intermediate layers there will be portions on which it can only act after a longer or shorter time, and of which the colour will consequently remain yellow while the cellules around have assumed a red colour. Those cells which lie on the thin edges of the section are always first tinged, evidently because the air affects them first. It is practicable too to alter at will the hue of one or more cells, to effect which it suffices to remove a thin slice from a previously dried root, some cells remaining uninjured ; then, if with great precaution certain cells be punctured with a curved point, so as to admit the entrance of the air, the yellow fluid with which they are filled will be seen to pass instantly to red. I have also placed some sections of *madder root* in water which had been exhausted of air by the operation of boiling, and in this case their originally yellow hue remained entirely unaltered, the utmost care having been previously taken to keep these sections of root in tightly closed bottles, without which they redden slightly.

I have tried the action of different gases collected in gra-

duated tubes plunged in the mercury, in which I deposited thin segments of fresh *madder root* cut both vertically and horizontally, and they remained there eight days without exhibiting the slightest change of hue. But when by means of a blow pipe I introduced a few drops of water into the tube of oxygen gas, the red colour was instantly produced. Carbonic acid gas did not appear to me to exhibit the same peculiarities; and certainly the oxygenated water, whether applied to the roots in a fresh or dry state, failed to effect the change to red at all more quickly than as much common water would have done.

Thin slices of young roots, when exposed for some hours to the air, after undergoing the customary transitions of tint, often acquire a blackish or violet hue which is not observable in old roots.

From all that has been stated, it results that the *madder root*, when living, has no colour but yellow, and that this colouring principle only varies by the deepening intensity of age. These different degrees of intensity are represented in the series of drawings, where I have represented the variation of hue in the roots from the young to the old state. This observation is easily verified; nothing more is necessary than to break two roots of different ages and to watch the change of hue from that instant till the air begins to take effect; the fluid will then be seen to be perfectly transparent while inclosed in the cells, but shortly this pellucid and pure liquid will become muddy and granulated so as to darken the parts of the cells with which it comes in contact. These granules, which seem to me to partake of the nature of gum resins, are partly soluble in alcohol; but as the dye of iodine fails to impart to them a blue colour, they do not show any identity with feculum. Their diameter is nearly equal, but they are inappreciable except in a mass, when insulated being hardly visible, as even with the aid of an excellent microscope divided in 300dths of millimetres, it was impracticable, by reason of their tenuity, to measure them precisely.

The *madder roots* many years old contain no coloured parts except what I have now pointed out, whether the plant be examined dry or after the exsiccated portions have been subjected to maceration. The existence of a yellow colour is

all that I have been able to ascertain, and the simple yet striking fact of the absence of the red colouring principle until the root has been pulverized, seems to have been unknown to the present day.

Still this observation, originally made by M. Chevreul, is stated in a paper by M. Kœchlin, inserted in the *Bulletins de la Société de Mulhausen*, vol. i. No. 3, in the following words: "By compressing the fleshy part of the fresh root an acid liquid is obtained, which, originally yellow, turns red when exposed to the air. This liquid, applied to a cloth that has received the mordant of acetate of alumina, produces a bright red, which by soap changes to a dullish rose. It tinges ammonia purple and concentrated sulphuric acid red, and an addition of water to the tinged acid precipitates the colouring substance. These experiments seem to prove that the colouring substance is in a state of solution in this fluid.

"The stalk of *madder* and its root, whether whole or the woody and fleshy parts individually, have been used to dye samples of the same size and printed with mordants red, pink, violet and black, and the result is that the fleshy part contains almost exclusively the colouring substance, the woody portion possessing no more of it than do the stalks of this plant.

"These various parts of the *madder*, when used fresh, have invariably produced much richer hues than the same parts if previously dried, although this process of desiccation had not diminished their weight. And however numerous were the experiments, their result was always the same.

"When the root is examined with the microscope, no trace of separate colouring substance is discernible; the woody part is very porous, as in all vegetables; and the fleshy portion seems composed of mucilaginous liquid parts, inclosed in a net-work of woody filaments, without offering any trace of porosity.

"The '*Alizaris*' of Avignon are composed of stems and roots; the former having been covered up with earth, assume the appearance of roots without acquiring their dyeing virtues, so that the cultivator who thus increases the quantity of his produce materially lessens its value. For these stems, containing very little colouring principle, this plan only tends to adulterate the *madder*, of which the quality thus depends on

the greater or less quantity of stem that had been buried and is now gathered and sold with the root."

The authors who have most fully treated this subject, however, regard the roots as imbued with a red colour while growing, and undergoing no change in this respect from subsequent circumstances. Many manufacturers, ignorant of this fact, to whom I submitted my observations, and showed the roots passing through all the stages of colour up to that which they attain when reduced to powder, while they formerly exhibited no trace of a red hue, have positively assured me that this remark would certainly lead to modifications in their manufacture. The assumption of a red colour is therefore a chemical phenomenon quite independent of vitality, while the yellow hue, on the contrary, seems to arise from a vital action which forbids the first; thus, if I place, for comparison, two portions of root, one living and the other dried, in a bottle, the former will preserve its yellow hue, while the second turns red, and in two days ends by acquiring a violet tinge.

Finally, the better to establish the vital power of the cells, and to prove that the production of the colouring principle was entirely determined by their peculiar action, I caused two young *madder plants* to germinate in distilled water; they grew very little, but the tissue of their roots notwithstanding secreted a yellow fluid, the tint of which seemed to me quite as decided as in young plants of equal size raised in earth. This colouring therefore depends on a peculiar action of the cellular membranes, to solve which it would be necessary first to solve that hitherto inscrutable problem of the vital powers*.

XXX.—Catalogue of the *Slender-tongued Saurians*, with Descriptions of many new Genera and Species. By JOHN EDWARD GRAY, Esq., F.R.S., Senior Assistant in the Zoological Department of the British Museum, &c.

THE Saurian reptiles may be divided into two nearly equal groups; one having a short, thick, slightly-nicked papillary tongue, and the other a more or less elongated forked tongue.

* [We shall reserve the author's analysis of the stems for a future Number of the *Annals*.—EDIT.]

The former of these groups contain two very distinct sections; the one consisting of the nocturnal lizards, as the *Geckoes*, which are easily known by the structure of their eyes and the composition of their skulls; and the other the diurnal lizards, as the *Agames*, *Chamæleons* of the Old World, and the *Iguanas*, which are confined to the new continent; the former have permanent teeth placed on the edge of the jaw, while the latter have them placed on the inner side of the jaw, below the edge, where they are gradually replaced by new ones as their edges become worn down by use.

As Messrs. Dumeril and Bibéron have lately published a work on the species of the thick-tongued lizards, leaving the description of the new species which I have of that group for the present, I at once proceed to the revision of the family and genera of the slender-tongued kinds, and describe the various new species which have come under my observation either in the National Collection or Museum of the Army Medical Board at Chatham.

The British Museum Collection of these animals is one of the richest that I have ever had the opportunity of examining, as the novelties of this catalogue will fully prove; and as it is daily receiving additions, I hope by the time that it is removed into its new locality it will be one of the most extensive in Europe.

Since the publication of the Synopsis of Reptiles, and my other papers on these animals, I have been induced to propose a new arrangement of them, of which the following table may be considered as an outline.

I. Typical group. Scaly Reptiles. (*Squamata*.) Body covered with scales; tympanic bones distinct; skull formed of separate bones.

1. Saurians. (*Saura*.) Jaws united by a bony suture; legs 2 or 4, rarely wanting.

Including the Saurian and Ophidosaurians of my former arrangements, except the genera *Amphisbena* and *Chirotes*.

2. Ophidians. (*Ophidia*.) Jaws very dilatile, only united by a membrane; legs none, or hid under the skin.

II. Annectant groups. Shielded Reptiles. (*Cataphracta*.) Body covered with square imbedded shields; tympanic bones inclosed in the skull, which is formed of hard united bones.

3. Amphisbenians. (*Amphisbena*.) Body cylindrical, with rings of square shields; penis double.

4. Chelonians. (*Chelonia*.) Body depressed, inclosed in a bony case, formed of the expanded ribs and sternum; penis simple; legs 4; jaws toothless.

5. Emydosaurians. (*Emydosaura*.) Body depressed, elongate, in-

closed between two shields formed of square plates; penis simple; legs 4; jaws toothed.

These orders appear to be analogous to the following Orders of Mammalia and Birds.

| Reptiles. | Mammalia. | Birds. |
|----------------------------------------------|--------------------|-------------|
| SAURIANS (Climbers) | PRIMATES | PASSERES. |
| OPHIDIANS (Carnivorous) | FERÆ | ACCIPITERS. |
| <hr/> | | |
| EMYDOSAURIANS . (Aquatic) | CETE | ANSERES. |
| CHELONIAN (Large-hoofed) | UNGULATA | GALLINÆ. |
| AMPHISBENIAN (———?) | GLIRES | GRALLÆ. |

Slender-tongued lizards. (*Sauræ Leptoglossæ*.) Tongue elongate, more or less slender, with the apex forked or bifid; eyes diurnal, generally provided with two connivent valvular eyelids; pupil round; body subcylindrical; the feet formed for walking; toes unequal, the outer hinder one being lower down and rather opposable to the rest.

Section I. Tongue contractile; head with regular normal shields; scales four-sided or lozenge-shaped; placed in rings.

Subsection 1. *Sides covered with small granular scales; scales and shields in transverse and longitudinal series.*

* *Sides rounded; head pyramidal; femoral pores distinct; throat scaly.*

Fam. I. TEIIDÆ.

Head pyramidal; supra-orbital plates horny; collar double; throat with scales. Confined to the New World.

* *Throat with two cross folds; the scales in the middle between them 6-sided; abdominal shields smooth; tail rounded; nostrils between two large nasal plates.*

a. *Abdominal shields small, longer than broad; dorsal scales small, equal.*

Teius, Merrem. *Podimema*, Wagler. *Monitor*, Fitz. Toes 5—5; tail round; "teeth on the edge of the jaw; front ones conical, hinder very blunt."

Teius Teguisin, Variegated Lizard, Shaw, Zool. t. 73. *Lacerta Teguisin*, Linn. Tupenambis Monitor, Daud.—*Spis*, t. 19. *Teius nitor*, Merrem. *Seba*, t. 96. f. 23. *P. Max.* t. from life.

South America.

Crenedon, Wagler. "Tail round; toes 5—5; teeth on the inner side of the jaws; front pectinately lobed, hinder 3-lobed, rest like *Teius*." Wagler.

Ctenodon nigropunctatus, Wagler. Tupen. *nigropunctatus*, *Spix*, *Braz. t.*

Inhab. South America.

ACRANTUS, Wagler. *Teius*, Fitz. Toes 5—4; tail round; teeth 6, front maxillary simple, with two rather acute transverse tubercles.

Acrantus viridis, Wagler. *Lacerta* Teyou. *Daud.*

Inhab. South America. (From the Berlin Mus.)

b. *Abdominal shields smooth, broader than long; thighs shielded beneath.*

AMEIVA, Cuv., Fitz. *Cnemidophorus*, Wagler. Toes 5—5.

Ameiva punctata. *Teius Ameiva*, *Merrem*.—*Spix. Braz. t.* 23. *P. Max. Beytr. t.* —. good. *A. vulgaris*, *Lichtst.*? *A. Argus*, *Fitz.*? *Guerin, Icon. Rept. t.* 4. f. 1. Olive; nape and front of back black speckled, sides with bands of black-edged white or yellow spots; abdominal shields 12-rowed.

Inhab. Demerara. Capt. Sabine, R.E.

Ameiva undulata, Seba, i. t. 88. f. 2. Olive brown with narrow brown wavy cross-bands; sides dark, pale, mottled with a palish streak on the upper part of each side; throat white; chest and belly greenish; sides dark, greenish, spotted; abdominal plates 12-rowed.

Inhab. —

Ameiva maculata, Seba, i. t. 88. f. 1.—t. 90. f. 7.? *A. lateristriga*, Cuv. Olive-green; back spotted, with a broad black streak down each side, edged beneath with a narrow white streak; sides and the black streaks, with cross-bands of small white spots; abdominal shields 10-rowed.

Var. back scarcely spotted, paler on each side near the lateral streak.

Inhab. Brazil.

Ameiva guttata. *Teius cyaneus*, Cuv. *T. cyaneus*, var. *Merrem. from Seba*, ii. t. 105. f. 2. *Lacép. i. t.* 31. *Seps murinus*, *Laur.* Olive-green; sides darker, with 6 or 7 cross-rows of 3 or 4 large white spots; abdominal plates 10-rowed.

Inhab. —

Probably the green-spotted lizard, *Edw. Birds*, t. 203; but our specimen is bleached, and does not show any pale tapering dorsal streaks. The tail of this specimen has been partly broken, and another false tail has sprouted from the crack. Such specimens are not uncommon in the animals of this family, hence they have been called *forked-tailed lizards*.

Ameiva dorsalis, *Sloane*, *Jam. iii. t.* 273. f. 3. Olive; back with a

pale central streak, commencing with a point in the nape, and gradually increasing in width to the thighs, with two wide black and two very narrow white lines on each side of it, and the lower part of the sides with two series of bluish spots; abdominal plates 10-rowed, lateral ones bluish-spotted.

Inhab. South America, Jamaica.

Ameiva lineata. *A. cœrulescephala*, Cuv.? *Daud. from Seba*, i. t. 91. f. 3. Bluish; back with 5 broad, dark, and 6 narrow, bluish white lines; sides white-spotted; belly greenish; abdominal plates 8-rowed; præanal plates 5.

Var. 1. The dark vertebral streak divided into two by a narrow central pale one.

Var. 2. Upper part of sides with an additional pale streak.

Var. 3. Younger; sides not spotted; back and sides with 10 linear, pale streaks. *Lac. Lemniscatus*, *Linn.* *Am. Lemniscata*, Cuv. *from Seba*, i. t. 92. f. 4.

Inhab. ———.

**** Throat with a collar of large shields.**

a. *The collar and ventral shields lanceolate, imbricate, keeled; thighs beneath scaly; nostrils between two nasal plates; tail round.*

ACANTHOPYGA. *Pseudoameiva*, Fitz. Scales of the back large, keeled; keels continuous; of the sides small, granular.

Acanthopyga striata. *Lacerta striata*, *Daud. Merrem. Wetter. Ann.* i. t. 1. *Pr. Max.* t. 13. *Guerin, Icon.* t. *Kentropyx striatus*, Fitz.

Inhab. Brazils.

CENTROPYX. *Trachygaster*, Wagler. *Acanthopyga*, Leach. The scales of the back moderate, ovate, keeled; of the sides rather smaller; of the belly very large.

Centropyx calcaratus.

b. *The ventral shields 4-sided, smooth, as long as broad; nostrils in the centre of a trigonal nasal shield; tail compressed.*

ADA, Gray. *Dracæna*, *Daud. Thorictis*, Wagler. Scales of the back unequal, larger ones oval; tail with a serrated crest on each side above. "Teeth on the edge of the jaw."

Ada Crocodilurus. *Teius Crocodilurus*, *Merrem. Dracæna Guinensis*, *Daud. Lacerta Dracæna*, *Bonnat.*

South America.

CROCODILURUS, Spix. Scales of the back equal; "teeth on the inside of the jaws;" rest like *Ada*.

Crocodilurus amazonicus, Spix. Braz.

Fam. 2. LACERTINIDÆ.

Head shielded; superorbital plate rigid; throat scaly; tongue exsertile, tip longly forked.

A. Collar distinct; dorsal scales somewhat granular; nostrils erect, lateral, subapical; ventral shields broad, smooth; toes simple.

ZOOTOCA, Wagler. *Lacerta*, Linn. Nostrils, in the suture of two scales, placed on the sides of the nose; abdominal shields square.

* *Dorsal scales rather long, 6-sided.*

Zootoca muralis. *Lacerta vivipara*, Jacq. *L. crocea*, Wolf. *Sturm's Fauna*, t. 4. *L. pyrogaster*, Merrem. *L. agilis*, Pennant. Male in summer. *Lac. œdura*, Sheppard.

Var. *Lacerta nigra*, Wolf. Black, nearly uniform.

Inhab. England, Germany. Var. Ireland.

See also *Lacerta Saxicola*, Eversman, Mem. Mosk. iii. t. 30. f. 1.

** *Dorsal scales small, broad, 6-sided.*

Zootoca quadrilineata, Gray. Collar continuous, even; ventral shields 6-rowed, middle row rather the narrowest, green, with irregular, unequal black spots.

Inhab. Sardinia.

LACERTA, Linn. Bonap. *Lacerta* and *Podarcis*, Wagler. Nostril erect, in the suture of three scales, placed on the side of the muzzle; abdominal shields square, two central series narrower, with oblique sides.

a. *Dorsal scales ovate, short, thick, smooth, convex.*

* *Abdominal plates 8 or 10-rowed (Lacerta).*

Lacerta ocellata, Daud. Edw. t. 202. Pet. Gaz. t. 92. f. 1. *Podarcis ocellata*, Wagler. Jun. *Lacerta Lepida*, Daud. iii. t. 37. f. 1.

Inhab. South of Europe.

Lacerta Senegalensis. Very like the former, but twice as large.

Inhab. Senegal.

** *Abdominal plates 6-rowed.*

Lacerta lævis, Gray. Greenish-grey, beneath greenish-white; dorsal scales roundish, 6-sided, convex; præanal plates with an arched series of 6 rather large shields in front.

Inhab. —.

b. *Dorsal scales elongate, keeled; throat scales large, broad.* *Podarcis*.

Lacerta viridis, Linn., Daud. iii. t. 34. *Podarcis viridis*, Wagler. *Lacerta varius*, Edw.

Var. 1. *Lac. bilineata*, Daud.

Var. 2. *Lacerta fusca*, Daud.

Inhab. Europe.

Lacerta agilis, Linn.? Lichst. Lac. Europæ, Pallas.

Var. 1. *Lac. stirpium*, Daud. iii. t. 35, f. 2.

Var. 2. *Lac. arenicola*, Daud, iii. t. 38, f. 2.

Inhab. Europe, England.

See also *Lacerta longicaudata*, Ruppell. Mus. Francf.

TEIRA, Gray. Nostrils erect, in the suture of three scales, lateral; abdominal shields (6-rowed) all square; throat scales small; toes simple.

Teira punctata. *Lacerta Dugesii*, Edw. Ann. Sci. Nat., t. 6, f. 2.?

Dark, blackish-green, darker on the sides, closely and minutely white speckled, beneath pale green; caudal scales obscurely keeled.

Inhab. Europe; Madeira?

EREMIAS, Fitz. Nostrils in the suture of three scales, lateral; abdominal plates with the outer side oblique and contracted behind; temple scaly; præanal scales two, small, triangular, one behind the other, with oblong four-sided shields on each side of them.

* *Abdominal shields 6-rowed; muzzle short; dorsal scales small; smooth, ovate.* Nucras.

Eremias Lalandii. *Lacerta Lalandii*. Edw. Ann. Sci. Nat. t. 5, f. 6., t. 8, f. 5.

Inhab. Cape of Good Hope.

** *Abdominal shields 14 or 16-rowed; scales smooth, small.* Eremias.

Eremias velox. *Lacerta velox*, Pallas.

B. Collar distinct. Dorsal scales rather granular. Nostrils horizontal in the keel on the sides of the muzzle. Toes fringed. Ventral shields oblique.

SCAPTEIRA, Fitz. Ida, Gray, MSS. Brit. Mus. Nostril in the upper edge of the first labial shield, with two small shields above and behind it; præanal shields numerous; abdominal shields rhombic, the central ones often narrowed on both sides behind; toes fringed on the outer side; the claws very long, acute.

a. *Præanal shields broad; three of the central series placed one behind the other; abdominal shields 8-rowed, rhombic.*

* *Dorsal scales large.*

Scapteira inæqualis. (*Ida inæqualis*, MSS. B. Mus.) Savigny Rept. Egypt, t. 1, f. 10? Pale olive; black dotted; scales of the back large, rhombic, keeled; of the sides small, keeled; tail very long, slender.

Inhab. N. Africa, Egypt.

** *Dorsal scales small.*

Scapteira pulchella. (*Ida pulchella*, Gray, MSS. Brit. Mus.) Savigny, Rept. Egypt, t. 2, f. 2.? Olive (under the epidermis brown); back with six longitudinal whitish streaks, and intermediate series of irregular unequal white spots; limbs white spotted, beneath white.

Inhab. Egypt.

Scapteira lineata. (*Ida lineata*, Gray, MSS. B. M.) Greenish; back and base of the tail with six bright blue longitudinal streaks; beneath yellowish; scales of the back rather large, rhombic, keeled; of the base of the tail short, sharply keeled.

Inhab. N. Africa.

b. *Præanal shields similar, but narrower; abdominal shields 10 or 12-rowed, contracted behind; interparietal plate rudimentary.*

Scapteira maculata. (*Ida maculata*, Gray, MSS. B. M.) Savigny Rept. Egypt, t. 1, f. 9.?? Greenish, with a broad pale dorsal streak, marked with indistinct blackish spots; sides of the back blackish, with three or four series of longitudinal oblong pale spots; scales of the back small, rhombic, acutely keeled; of the base of the tail broad, short; toes slightly fringed.

Inhab. Tripoli.

c. *Præanal shields unequal; the hinder central one large, the rest smaller, placed in an arched series; abdominal plates, 12-rowed.* *Ida*.

Scapteira inornata. (*Ida inornata*, Gray, MSS. B. M.) Greenish olive; tail paler, with a dark streak on each side; beneath silvery white; scales of the back small, ovate, acutely keeled; of the base of the tail broad; præanal scales 10 or 12, subequal, with small scales on the sides, placed in four transverse subalternating series.

Inhab. Tripoli.

Scapteira punctulata. (*Ida punctulata*, Gray, B. M.) Olive; back with six longitudinal series of small distant blackish dots; tail and cheeks brown varied; beneath whitish; scales of the back small, convex, rather rhombic, smooth; of the tail elongate, narrow.

Inhab. —.

Scapteira nebulosa. (*Ida nebulosa*, Gray, MSS. B. M.) Pale olive; back with three series of rather large distant black spots; tail elongated, with a series of black dots on each side; scales of back minute, granular, smooth, flattish, of upper part of tail elongated, truncated.

Inhab. Egypt.

Scapteira leiocerca. (*Ida leiocerca*, Gray, MSS. B. M.) Olive black, varied with brown, leaving six series of small round pale spots, and six series of large oblong transverse pale spots, placed between the others; scales of the back small, rhombic, acute, smooth; of the base of the tail large, similar, smooth.

Inhab. —.

The toes of *S. inornata* are longly, of *S. inæqualis*, *S. maculata*,

S. lineata, and *S. leiocerca* shortly, and of *S. pulchella*, *S. punctulata*, and *S. sabulosa* scarcely fringed.

MEROLES, Gray. Nostrils horizontal, marginal, between two scales; the lower one placed over the first and second labial shield, and with a small triangular scale at its hinder edge; præanal shields numerous; central ones in a longitudinal series; abdominal shields rhombic; toes fringed on the outer side; dorsal scales small, rhombic, keeled; abdominal plates 12 or 14-rowed.

* *Interparietal plate large.*

Meroles Knoxii. *Lacerta Knoxii*. *Edw. Ann. Sci. Nat.* t. 6. f. 8. Inhab. S. Africa, Cape of Good Hope.

** "*Interparietal plate rudimentary.*"

Meroles Dumerilii. *Lacerta Dumerilii*. *Edw. Ann. Sci. Nat.* Inhab. Senegal.

C. Collar none, with a small axillary plait on each side, sometimes obsolete. Dorsal scales lanceolate, keeled. Nostrils superior subapical.

MESALINA, Gray. Nostrils marginal, convex, in the centre of three small unequal nasal scales, placed over the first labial plate; loreal shields 2, first linear, hinder triangular; scales of back small, convex; ventral shields subrhombic, 2 central series narrower; præanal shield single, surrounded by a series of 4 or 6 small ones, and then some smaller scales; toes slender, nearly simple; claws long.

Mesalina Lichtensteinii. Olive, beneath whitish; abdominal shields 8-rowed; scales of the back ovate, rhombic, convex, smooth; of the tail rhombic, elongate, slightly keeled.

Inhab. N. Africa?

D. Collar indistinct, united to the chest in the middle, with a distinct plait before each shoulder; dorsal scales rhombic, keeled.

CABRITA. Nostrils in a horizontal suture, between two small nasal shields, having a smaller one behind them. Collar adnate in the middle, free on the sides; præanal shield single, surrounded by five small shields in front; scales of the back rhombic, keeled.

Cabrita brunnea. Ventral shields 6-rowed, central ones narrowed on each side; middle of the back bay; sides dark brown, with two rather wider white streaks on each side; tail and limbs pale brown, beneath silvery.

Inhab. —.

Collection of Thomas Bell. Esq.

ALGIRA, Cuv. *Psammuris*, Waglër. Nostrils small in the horizontal suture, between two nasal scales, which have two others at their hinder side, so that it appears nearly in the centre of four small shields; ventral shields six-sided; scales of the back broad, rhombic,

keeled; two central præanal shields largest, placed one behind the other, rest smaller.

Algira punctata, Gray. Olive-green, sides pale, black-spotted, with two white streaks on each side; temples scaly, with two small shields.

Inhab. Shores of the Mediterranean.

Algira Cuvieri, Gray. Olive-green; sides black, with three narrow green streaks; side of the back black and white-spotted; ventral shields silvery, with a central black spot; temple unequally shielded.

Inhab. —.

Mus. Frankfurt.

Psammodromus, Fitz. Nostrils in the suture between two unequal nasal plates; ventral shields ———?; scales of the back acute, keeled; præanal shields, one large, surrounded by many small ones; collar none; a band of shields close to the front of the chest, and only separated from them by a series of small scales, which are hidden, except when the head is bent back.

Psammodromus Hispanicus, Fitz.

Inhab. Spain.

Mus. Frankfurt.

[To be continued.]

XXXI.—*Characters of Nine new Species of Glumaceæ.* By Dr. C. G. NEES v. ESENBECK, President of the Imperial Academy *Naturæ Curiosorum*. Extracted from a Letter to Professor Lindley.

Melica colpodoides; panicula composita et decomposita (ante anthesin contracta), pedicellis nudis scabro-puberulis, spiculis oblongis bi-trifloris, glumis inæqualibus obtusiusculis, superiori flosculos subæquante, valvula inferiori flosculorum perfectorum apice brevi spatio membranaceo-appendiculata 7-nervi, flosculo supremo sterili, sublineari, antheriformi! foliis anguste linearibus vaginisque scabris. (*M. scabræ* et *pallidæ* H. et K. affinis).—California, Douglas.

α, sesquiflora.

β, subtriflora.

Lophochlæna californica. Ch. Gen. Spiculæ multifloræ, rhachilla articulata. Glumæ 2, membranaceæ, obscure 1—3-nerves, flosculis breviores. Flosculi callo truncato inserti, omnes perfecti: valvula inferior chartaceo-rigida, plurinervis, apice membranacea, bifida, lobis præmorsio-dentatis, inter lobos setigera seta recta; superior plano-complicata lateribus in medio dentato-laceris apicem versus serratis; apice emarginato. Lodiculæ truncatæ, connatæ. Stamina 3 (antheris violaceis). Ovarium oblongo-lineare, glabrum; styli breves, discreti; stigmata parva plumulosa. Inflorescentia: racemus simplex, secundus. Gramina mollia. Folia brevina. Spiculæ bro-

moides, oblongo-lineares, speciosæ. Locus inter *Poas Glycericæ* juxta *Glyceriam*, cui mediante *Glyceria* (Windsoria) pallida consiliatur. Forsan hæc *W. pallida*, amplificatio generis nostri characteres, isti potest connecti.—California, Douglas.

Polyantherix Hystrix. (Trib. Triticeæ. Locus inter *Elymum* et *Ægilopem*.) Ch. Gen. Rhachis spicæ articulata. Spiculæ disticho-alternæ, geminæ, rhachi oblique parallelæ, plurifloræ, subsessiles. Glumæ binæ, collaterales, hinc ad speciem quaternæ, profunde bifidæ laciniis bifidis trifidisve omnibus longe setaceis, tertia (ubi adest) minima. Flosculi 3—4, inferiorum uno alterove sterili glumis simili, summo tabescente. Fertiliū valvula inferior chartacea, ex apice bidentato bisetove longe setigera; superior minor, integra, marginibus inflexis, flexuræ angulis ciliatis. Lodiculæ lanceolatæ, integre, ciliatæ. Stamina 3, antheris brevibus. Ovarium apice hirsutum; styli distantes; stigmata plumosa. Gramina specie *Elymi* et *Hordei*. *Polyantherix Hystrix* est *Ægilops Hystrix* Nutt. gen. I. p. 86.—California, Douglas.

Poa Douglasii; paniculæ ovatæ ovalisve densæ spiciformis ramis geminis brevibus inæqualibus, apiculis ovatis compressis trifloris pallidis, valvulis acutis basi liberis dorso parce ciliolatis, inferiori acute carinata 5-nervi, culmo (foliis breviori) simplici ad paniculam usque vaginato, vaginis albo-membranaceis, foliisque convoluto-filiformibus glabris et lævibus, radice repente (filiformi). Est e societate Poarum: tricoloris, conformis, curvulæ, abbreviatæ R. Br. etc.—California, Douglas.

Chasmanthium ornithorhynchum; racemo subspicato simplici, flosculis divaricatis æquivalvibus. (*Chasmanthium gracile* Link sic describo: Ch. racemo composito, flosculis erectis inæquivalvibus. In characteres generico del.: "valvula superior brevior."—Alabama, Drummond.

Ceratochloa simplex; racemo simplici paucifloro erecto, spiculis oblongo-lanceolatis pubescentibus, arista flosculum subæquante, gluma superiori et valvula inferiori 7-nerviis, vaginis retrorsum foliis in pagina superiori antrorsum pubescentibus. (Species a reliquis distinctu facilis.)—Peru, Mathews, No. 717.

Eragrostis cretacea; spica simplici rigida, rhachi undata marginata, spiculis secundis distichis incumbentibus alternis 4-floris subovalibus utrinque convexis, glumis æqualibus ad carinam bisulcis, valvula inferiori ovata obtusa angulato-trinervi, culmo humili erecto simplici compresso, foliis angustis complicatis glabris. Similis *Eragrosti bifariæ*, sed habitu alieno.—Madras, Mr. Griffith.

Meoschium Griffithii, N. & W.; spicis binis, spicula altera subsessili, utriusque gluma inferiori late semiovata margine exteriori dilatato aliformi lævi, reliquo dorso a basi usque ad medium fere transversim arcuato-rugoso cartilagineo, spicula subsessili hemilogama mutica, foliis linearibus vaginisque glabris, culmo humili ad apicem usque vaginato. *Meoschio Arnotiano* affine, at sat distinctum.—Madras, Mr. Griffith.

Isolepis hispidula; capitulo globoso polystachyo densissimo, spiculis compresso-trigonis pubescenti-scabris ovalibus, squamis ovatis carinatis infra

apicem mucronatis pallidis carina viridi trinervi, involuero diphylo altero capitulum subaequante, foliis subulatis brevibus culmoque pubescentibus, vaginis ore barbatis, caryopsi obovato-trigona laeviuscula. *Isolepidi barbatae* similis, differre videtur pubescentia et foliis crassioribus, cct.—Madras, Mr. Griffith.

XXXII.—*An Attempt to ascertain the Fauna of Shropshire and North Wales.* By T. C. EYTON, Esq.

[Continued from Mag. of Zool. and Bot., vol. ii. p. 542.]

No. II. *Aves.*

Falco peregrinus, Ray. (Peregrine Falcon.) Not an uncommon bird on the Welsh coast, rearing its young on shelves of rock overhanging the sea. I have never observed nests nearer to one another than two miles. Two or three specimens have occurred in Shropshire. A fine old bird was this winter (1837) procured by John Rocke, Esq., near Clungurford. I have several times succeeded in training the young bird (the lanner of Fleming and Pennant,) for hawking pigeons and partridges, and found the process much easier than I could have supposed from the accounts of it given in the older books on the subject; indeed, excepting the treatise by Sir John Sebright, there is not more humbug contained in any description of books than in those on hawking.

The trachea of the Peregrine Falcon is furnished with two pairs of muscles of voice, similar to those described by Mr. Yarrell in the Linnæan Transactions to exist in the Indian crowned pigeon.

Falco Subbuteo, Ray. (Hobby.) Several specimens have occurred near the Stretton hills in Shropshire: all that I have seen have been in the young state of plumage.

Falco Esalon, Ray. (Merlin.) Rare in Shropshire, but breeds not uncommonly in the neighbourhood of Cader Idris, where the young are generally supposed to be of a different species, and is called the stone Falcon.

Falco Tinnunculus, Ray. (Kestrel.) Common. The kestrel is generally supposed to be the most common of the British hawks; but in the neighbourhood of Eyton, and I believe that most of the gamekeepers in Shropshire will say the same, the sparrow-hawk is decidedly the most common. On the Welsh coast, on the contrary, I have obtained in general about four specimens of the kestrel for one of the sparrow-hawk.

Falco (Menofalco, Cuv.) Islandicus, Linn. (Gyr Falcon.) One of

these rare British birds was killed three or four years ago on Lord Cawdor's estate in Wales.

Aquila Chrysaetos, Linn. (Golden Eagle.) "This kind of eagle sometimes migrates into Caernarvonshire, and there are instances, though rare, of its having bred in the Snowdon hills, from whence some writers give that tract the name of Creigiau'r eryri, or the eagle rocks."—Penn. Brit. Zool.

Falco (*Pandion*, Sav.) *Haliaetos*, Linn. (Osprey.) A fine specimen is in the possession of Burton Borough, Esq., of Chetwynd, Salop, killed a few years ago, while hovering over a pool near that place.

Accipiter fringillarius, Ray. (Sparrow-hawk.) Common.

Milvus regalis, Briss. (Kite.) Formerly common both in this county and in Wales, but is now becoming rare in consequence of the persecution it has undergone from gamekeepers.

Falco Buteo, Sibb. (*Lagopus*, Linn.) (Rough-legged Buzzard.) A specimen is in my collection, killed near Ludlow; and in the edition of Pennant's British Zoology, published in 1812, vol. i. p. 228. will be found a note mentioning a specimen, obtained in Flintshire.

Buteo vulgaris, Sibb. (Common Buzzard.) Common in North Wales; now and then I have observed a solitary one, or a pair, in some of the large woodlands in Shropshire. This species is easily tamed.

Falco (*Circus*, Briss.) *cinereus*, Mont. (Ash-coloured Harrier.) But one of this species has come under my observation, nor have I ever heard of others. The specimen alluded to was killed near Dolgelly.

Falco (*Circus*, Briss.) *Pygargus*, Linn. (Common Harrier.) I have several times observed these birds near Corwen; they have also been observed near Walford by R. A. Slaney, Esq. It is remarkable with what regularity they return to the same beat at the same time for many days together, which propensity often tends to their destruction.

Circus rufus, Briss. (Moor Buzzard.) Common in Wales. This bird takes endless varieties with regard to the colouring of the head, the crown being sometimes of the same colour as the rest of the body, (as in the specimen figured in Loudon's Mag. Nat. Hist., which is now in my possession,) and sometimes nearly white.

Otus vulgaris, Flem. (Long-eared Owl.) Though not common, has several times occurred in the district.

Strix (*Otus*, Cuv.) *Brachyotus*, Gmel. (Short-eared Owl.) Tolerably common in Wales, where it is called the Woodcock Owl, from its arriving about the same time with that bird.

Strix flammea, Linn. (Barn Owl.) Common.

Strix (*Syrnium*, Sav.) *stridula*, Linn. (Wood Owl.) Common.

Strix (*Syrnium*, Sav.) *Tengmalmi*, Linn. The bird described by Pennant under the name little owl, does, I believe, belong to this species; he mentions it as having occurred in Flintshire.

Lanius Excubitor, Linn. (Great Shrike.) Only once observed near Capel Curig, North Wales[§], in the month of May.

Lanius Collurio, Linn. (Red-backed Shrike.) Very common in Wales, particularly near Capel Curig and Barmouth; at the latter place they feed chiefly on insects belonging to the genus *Geotrupes*, which particularly abound. At Capel Curig grasshoppers appear to constitute their chief food: some dozens of them may be seen on the side of the hill above the lakes, which is thinly covered with scattered hawthorn bushes, and abounds with their prey. This species, when taken young, is very easily tamed, and makes a mischievous but amusing pet.

Muscicapa grisola, Ray. (Spotted Fly-catcher.) Common.

Muscicapa atricapilla, Gmel. (Picd Fly-catcher.) The Rev. John Roche, of Clungurford, possesses a specimen of this bird killed near Downton.

Bombycilla Bohemica, Briss. (Bohemian Chatterer.) Four specimens were killed a few years ago by the last-mentioned gentleman, and are now in his possession, beautifully preserved by Mr. Shaw of Shrewsbury. Other specimens have also occurred in the neighbourhood of Oswestry.

Turdus Merula, Linn. (Blackbird.) Common. The white variety has also occurred.

Turdus torquatus, Linn. (Ring-Ousel.) Not uncommon in Wales. I have several times observed them on the Borroyn chain, near Corwen, but never in the valleys or on the tops of the hills; but at a certain elevation, until driven out, they keep themselves closely hid in the fern and heath-bushes. An observation of this kind with regard to elevation was made on a species of thrush inhabiting Java (*T. varius*) by Dr. Horsfield.

Turdus viscivorus, Linn. (Missel Thrush.) Common. This bird among the lower classes in Shropshire is known by the name of the storm cock, from its being said to utter its peculiar chattering note before rain.

Turdus pilaris, Linn. (Fieldfare.) Common. Mr. Selby, in his British Ornithology, states that these birds do not arrive until November in this country. I have observed a flight of them in Shrop-

shire as early as the 20th of September. They occasionally remain as late as the 20th of April.

Turdus iliacus, Linn. (Redwing.) Common. A few of these birds remain in the neighbourhood of Eyton all the summer. In order to place this beyond doubt I have killed several, but have never succeeded in finding their nests: the great bulk of them, however, arrive about the same time as the preceding.

Cinclus aquaticus, Bechst. (Dipper.) Common on most rocky rivers in the district.

Motacilla (*Saxicola*, Bechst.) *Rubicola*, Linn. (Stone-chat.) Common in Wales, particularly in the neighbourhood of Holyhead: not nearly so abundant in Shropshire.

Motacilla (*Saxicola*, Bechst.) *Rubetra*, Linn. (Whin-chat.) Common during the summer months in Shropshire, where it is called the utich or hutic.

Motacilla (*Saxicola*, Bechst.) *Œnanthe*, Linn. (Wheat-ear.) Rather rare in the district; all that I have observed have been in September, probably during their migration.

Motacilla (*Ficedula*, Bechst.) *Rubecula*, Linn. (Red-breast.) Common.

Motacilla (*Philomela*, Sw.) *Luscinia*, Linn. (Nightingale.) Frequent during summer the southern border of the district: I cannot trace them further northward than the Wrekin.

Sylvia (*Salicaria*, Selby.) *arundinacea*, Lath. (Reed Warbler.) Common.

Sylvia (*Salicaria*, Selby.) *Phragmitis*, Bechst. (Sedge Warbler.) Not so common as the preceding.

Motacilla (*Curruca*, Briss.) *Atricapilla*, Linn. (Blackcap.) Common.

Sylvia (*Curruca*, Briss.) *cinerea*, Lath. (Greater White-throat.) Common. Arrives generally during the first fortnight in April.

Curruca garrula, Briss. (Lesser White-throat.) Somewhat rare, but I have always observed a few specimens in the neighbourhood of Eyton before the leaves appear, and generally before the arrival of the greater white-throat.

Motacilla (*Accentor*, Bechst.) *modularis*, Linn. (Hedge Sparrow.) Common.

Sylvia (*Regulus*, Cuv.) *ignicapilla*, Brehm. (Fire-crested Wren.) Rare; but two or three specimens have been observed.

Regulus aurocapillus, Selby. (Gold-crested Wren.) Common.

Sylvia (*Sylvicola*, nob.) *sibilatrix*, Bechst. (Yellow Wren.) Ar-

rives in Salop generally during the last week in April: not so common as the two following.

Sylvia (Sylvicola, nob.) Trochilus, Lath. (Willow Wren.) Common: arrives generally before the last-mentioned species.

Sylvia (Sylvicola, nob.) rufa, Lath. (Chiff-Chaff.) Common, and arrives about the same time with the last. The three last-mentioned species are difficult to distinguish: the only constant character appears to be the sloping of the quill-feathers, given in Jenyns' Manual of British Vertebrata.

Troglodytes Europæus, Steph. (Wren.) Common.

Motacilla alba, Linn. (White Wagtail.) Common.

Motacilla (Budytes, Cuv.) flava, Linn. (Yellow Wagtail.) Common: generally observed to arrive about the 29th of April.

Motacilla (Budytes, Cuv.) Boarula, Linn. (Grey Wagtail.) Common: departs about the end of March, and arrives in September.

Alda (Anthus, Bechst.) trivialis, Linn. (Pipit Lark.) Occasionally met with near Eyton, but not commonly.

Alda (Anthus, Bechst.) pratensis, Linn. (Tit Lark.) Very common during the winter months, in company with wagtails on flooded meadows.

Anthus aquaticus, Bechst. (Rock Lark.) Found in the neighbourhood of Holyhead, particularly between the town and the South Stack lighthouse, where it may be seen hopping about in search of small marine animals on stones which the sea has just left.

Alda arvensis, Linn. (The Lark.) Common.

Alda arborea, Linn. (Wood Lark.) I have never observed this species in the neighbourhood of Eyton, but near Walford it is not uncommon, remaining all the year.

Parus major, Linn. (Great Titmouse.) Common.

Parus ater, Linn. (Cole Tit.) Common.

Parus palustris, Linn. (Marsh Tit.) Common.

Parus ceruleus, Linn. (Blue Tit.) Common.

Parus caudatus, Linn. (Long-tailed Tit.) The singular provincial name of Huggen muffin is attached to this bird.

Emberiza Citrinella, Linn. (Yellow-hammer.) Equally common everywhere. Specimens obtained in Anglesey, near Holyhead, were of a much brighter yellow than those obtained at the same time of year in Shropshire.

Emberiza Schœniculus, Linn. (Reed Bunting.) Common.

Emberiza Miliaria, Linn. (Great Bunting.) Common.

Fringilla (Pyrgita, Cuv.) domestica, Linn. (Sparrow.) Common.

Fringilla (Pyrgita, Cuv.) montana, Linn. (Mountain Sparrow.)

Rare in the district, but occasionally seen in the neighbourhood of Walford.

Fringilla Cælebs, Linn. (Chaffinch.) Common.

Fringilla Montifringilla, Linn. (Brambling.) Occurs regularly, but sparingly, in Shropshire, during the winter months, frequenting beech trees, and feeding on the mast.

Carduelis aurata, nob. (Goldfinch.) Common.

Fringilla (*Linaria*, Bechst.) *Spinus*, Linn. (Siskin.) Found commonly in Shropshire during winter; frequenting the tops of alder trees, on the seed of which it feeds, in company with the lesser redpole.

Fringilla (*Linaria*, Bechst.) *borealis*, Roux. *Linaria canescens*, Gould. (Mealy Redpole.) At different times, I have obtained several specimens of this bird in Shropshire, but have never observed them in large flights, the utmost number I have ever seen together being ten or twelve, in company with the siskin, in which points they differ in habit from both the greater and lesser redpoles.

Fringilla (*Linaria*, Bechst.) *flavirostris*, Linn. (Lesser Redpole.) Common in winter, in company with the siskin, and feeding in the same manner.

Fringilla (*Linaria*, Bechst.) *cannabina*, Linn. (Greater Redpole.) Common.

Fringilla (*Linaria*, Bechst.) *Montium*, Gmel. (Mountain Linnet.) Occasionally found in Shropshire: common in North Wales, where it breeds, making its nest on the ground under the shelter of some furze bush or tuft of grass.

Loxia (*Coccothraustes*, Briss.) *Chloris*, Linn. (Greenfinch.) Common.

Loxia (*Coccothraustes*, Briss.) *vulgaris*, Flem. (Grosbeak.) A regular winter visitant, frequenting fir trees in the neighbourhood of Hawkstone and elsewhere, and often seen in company with the crossbill.

Pyrrhula vulgaris, Temm. (Bullfinch.) Common.

Loxia curvirostra, Linn. (Crossbill.) Occasionally found on fir and pine trees, during the autumn and winter months, particularly such as stand high, as in those of Hawkstone and Pimhill: arrives in September.

Sturnus vulgaris, Linn. (Starling.) Common. I have at different times seen many starlings, with their upper and lower mandibles crossed; one is in my collection: they have all been birds taken from the nest. *Query*. Does not a tendency to this monstrosity show an affinity to the crossbills?

Turdus (Pastor, Temm.) roseus, Linn. (Rose Ousel.) A beautiful male specimen of this very rare British bird was killed three or four years ago in the garden behind the hotel at Holyhead, where it had been observed for a day or two before; its habits were described by the gardener as being like those of the thrush: the preserved skin is in the possession of Captain Stephens, formerly of that place, who kindly permitted me to inspect it.

Corvus (Fregilus, Cuv.) Graculus, Linn. (Chough.) Found commonly on all the bold headlands of the Welsh coast. I have several times procured young ones and tamed them: they are exceedingly amusing, though very mischievous, stealing everything they can carry off. I never, although they made all sorts of odd noises, succeeded in teaching one of them to articulate clearly any sound: they were particularly fond of cheese, attacking any nest of mites whenever they could find their road to the cupboard: they learned to know the servants' dinner hour, and if not admitted would rap at the window with their strong bills, much to the danger of the glass. During winter, in their wild state, they proceed some distance into the country, often accompanying flights of rooks and jackdaws; but during summer I have never observed them far from the sea-coast.

Corvus Monedula, Linn. (Jackdaw.) Common.

Corvus frugilegus, Linn. (Rook.) Common.

Corvus Corax, Linn. (Raven.) Often observed in Wales: a few pair breed in Shropshire, and have been known to build in the same trees from time immemorial, in spite of the nest being robbed every year.

Corvus Corone, Linn. (Crow.) Common.

Corvus Cornix, Linn. (Hooded or Royston Crow.) A few years ago I obtained one of these birds during winter by setting a trap near a dead sheep: this is the only instance I know of its occurrence.

Pica caudata, Will. (Magpie.) Common during winter. More than two or three of these birds are seldom seen together; but in March and April, after they have built their nests, I have observed flights of forty and fifty roost in the same plantation.

Corvus (Garrulus, Briss.) glandarius, Linn. (Jay.) Common. I have several times observed that if the nest of this bird be found and the eggs touched or disturbed, they are sure shortly to disappear. Query. Are they carried off by the bird to some safer situation?

Corvus (Nucifraga, Briss.) Caryocatactes, Linn. (Nut-cracker.) The only specimen that I know of, obtained in the district, is one mentioned in Pennant's 'British Zoology,' killed near Mostyn in Flintshire, October 5, 1753.

Hirundo (Cypselus, Ill.) Apus, Linn. (Swift.) Common.

Hirundo urbana, Linn. (House Martin.) Common: arrives about the same time with the swallow.

Hirundo rustica, Linn. (Swallow.) Common: arrives generally about the 20th of April, but I have observed one or two earlier.

Hirundo riparia, Linn. (Sand Martin.) Common: arrives the first of the swallow tribe, generally about the 10th, or from that to the 15th, of April.

Caprimulgus Europæus, Linn. (Goat-sucker.) Common in North Wales; not very common in Salop.

Sitta Europæa, Linn. (Nuthatch.) Common.

Certhia familiaris, Linn. (Creeper.) Common.

Upupa Epops, Ray. (Hoopoe.) One individual of this species was observed near the Black Bushes, Salop, four or five years ago, and shortly afterwards one was killed in the neighbourhood, probably the same: it is now in the collection of Sir Andrew Tobit, Bart.

Alcedo Isipda, Ray. (Kingfisher.) Common. A short time ago, having placed a net partially over a small bait pool, stocked with minnows, to defend them from the herons, a kingfisher got entangled on the under side of it, and was drowned in the heat of the chase: he must have gone two or three inches under water in order to get round the edge of the net.

Picus viridis, Ray. (Green Woodpecker.) Common.

Picus major, Linn. (Greater Spotted Woodpecker.) Not so common as the other two species.

Picus minor, Linn. (Lesser Spotted Woodpecker.) Common at Nesscliff and Hawkstone.

Cuculus canorus, Linn. (Cuckoo.) Common, arriving about the 10th of May. I once obtained a young one as late as the end of September.

Tetrao Tetrix, Linn. (Black Game.) Found in most of the extensive heaths of Shropshire: has been introduced on the Beawyn chain near Corwen, but appears to decrease in numbers.

Tetrao (Lagopus, Vieill.) Scoticus, Lath. (Red Grouse.) Common on the Welsh mountains, and also on the Stiperstones in Shropshire.

Perdis cinerea, Ray. (Partridge.) Common: the partridges found on the Welsh mountains are of a smaller size than those of Shropshire.

Coturnix vulgaris, Flem. (Quail.) In former times appears to have been met with rather commonly in Shropshire by sportsmen in September, but of late years rarely. I once saw a bevy of nine near Eyton.

Columba Palumbus, Linn. (Wood Pigeon Quice.) Common during the winter months, doing great mischief to the young clover by feeding on it, picking out the green leaves in the centre of each bunch.

Columba Œnas, Ray. (Stock Dove.) Common.

Turtur auritus, Ray. (Turtle Dove.) Breeds in Shropshire, where it is called the Wreckin dove.

XXXIII.—*A Reply to Mr. Ogilby's Communication to the Annals of Natural History respecting Phalangista Cookii.*
By J. E. GRAY, Esq., F.R.S., Senior Assistant in the Zoological Department of the British Museum.

My dear Sir,

IN replying to Mr. Ogilby's communication in your last Number I will not suffer myself to be betrayed into the use of acrimonious expressions, which are unsuited to scientific discussions, and serve only to irritate, and which I should regret the moment they were written. The only purport of this note is to explain, in as few words as possible, my impressions relative to the material facts adverted to in the communication to which I refer.

The scientific objects of that communication are two in number; first, Mr. Ogilby contends that my name of *Antelope Zebra* should yield to that of *A. Doria* previously published by him; and on this point, as your readers are already aware, we are agreed:—secondly, Mr. Ogilby maintains that the name of *Phalangista Cookii* should be applied to the animal discovered by Sir Joseph Banks in Cook's first voyage, instead of that figured and described by Captain Cook himself. On this we differ; but I know not why this difference of opinion should give rise to angry feelings, or lead to the imputation of unworthy motives.

As regards the first point, it is scarcely necessary to do more than refer to the note which you have already printed (p. 221). I may state, however, that when my description of the two more perfect specimens of the antelope in question, then in my possession, was printed in the *Annals*, I was quite unconscious that Mr. Ogilby had published anything on the subject. Mr. Bennett had described the original specimen as "obtained by Mr. Gould from Algoa Bay," and had indicated his opinion of its relations in the following terms: "The quality of the fur is rather rigid, and the hairs are adpressed,

resembling in these particulars the covering of the zebras. It may not improbably belong to some species of antelope with which Europeans are yet unacquainted." (Proc. Zool. Soc. 1832, p. 123.) Mr. Ogilby's reference to it (Proc. Zool. Soc. 1836, p. 121) is verbatim as follows: "The beautiful species mentioned by Mr. Bennett (Proc. Zool. Soc. 1833, p. 1), which is a real *antelope*, and which I hope shortly to have an opportunity of describing in detail under the name of *A. Doria*, as a friend who has connections with the west coast of Africa has kindly undertaken to procure me skins."—He refers it, without stating any reason, to a group of antelopes, all the distinctive characters of which, as given by himself in the same place, are derived from the head and horns, neither of which (in *A. Doria*) are yet known to zoologists. This brief and incidental notice I had entirely overlooked; but immediately on being made acquainted with it, so little did I desire to usurp the honours of a questionable name, that I wrote of my own accord to Mr. Ogilby, stating my "intention to correct the error in the next Number of the Annals." At the same time I wrote the note published in your last Number, which, however, not being immediately sent to you, was mislaid and forgotten. To the charge of having neglected to send you the promised correction I plead guilty in the fullest extent, and must patiently submit to the punishment due to my crime. I may plead, however, in mitigation, that I had already placed in Mr. Ogilby's own hands a full and voluntary confession of my default.

On the question of nomenclature (the only practical point involved in the second count of Mr. Ogilby's indictment), I am more than ever convinced, after a careful re-examination of the subject, of the justice of the conclusion to which I had originally come. My *Phalangista Banksii* was discovered at Endeavour River, within the tropic, on the east coast of New Holland, by Sir J. Banks, in Captain Cook's first voyage (see Hawkesworth, iii. 586); it is not however there described, but a specimen brought home by the expedition formed the basis of Pennant's description of his "New Holland Opossum" in his History of Quadrupeds, edit. 1781, p. 310, and I am not aware of any other published description that can with certainty be referred to this species. My *Ph. Cookii* was found at Adventure Bay in Van Diemen's Land, in Captain Cook's third voyage; it is there described and figured. That figure and description are universally referred to as the originals from which the name of *Ph. Cookii* was derived; and even if the specimen described by authors under that name belonged to a different species, I should still maintain that the name of *Ph. Cookii* ought to remain connected with the animal figured

and described by Captain Cook himself. But it is quite unnecessary for my argument to go this length; for although Mr. Ogilby states very decidedly that the specimens in the Paris Museum belong to the continental or New Holland species, (meaning, I presume, that which was originally found at Endeavour River,) I think there are strong grounds for doubting the correctness of this opinion, which I will now proceed to state.

1st. All the French writers, as far as I am aware, who have described the *Phalangista Cookii*, and who mention its locality, speak of it as peculiar to Van Diemen's Land.

2ndly. Their descriptions appear to me strictly applicable to the Van Diemen's Land species.

3rdly. The original specimens in the French Museum are stated by M. Desmarest to have been brought home by Peron and Lesueur, and by M. Temminck to have been derived from the voyage of Labillardière. I know not which of these gentlemen is right, but in either case it is much more probable that the specimens were from Van Diemen's Land than from Endeavour River, both expeditions having visited Adventure Bay, while Peron and Lesueur touched at no part of the east coast of New Holland, except Port Jackson, and Labillardière did not visit that coast at all. I may add, that the Van Diemen's Land species is by far the most abundant in our own collections*.

These reasons appear to me to be so conclusive, that I would even venture to hope that they may induce Mr. Ogilby to reconsider his opinion.

As regards the personal matter introduced into the question by Mr. Ogilby, I am loath to meddle with it; he has, however, rendered it necessary that I should state the facts in justice to myself, and I am determined that this shall be done without a word of harshness or recrimination. Long before Mr. Ogilby made his observations on the subject at the Zoological Society, I had satisfied myself that there existed two very distinct varieties or species of white-tailed phalanger, confounded by Shaw under the name of "White-tailed Opos-

* To obviate any misunderstanding, it may be observed that M. Temminck has erroneously referred to a specimen in the French Museum, brought home by M. Gaimard, as having been procured from the island of Rawak, one of the Moluccas; but this error has been corrected by M. Lesson (Dict. Class. d'Hist. Nat. 13.), who, after giving Van Diemen's Land as the habitat of the species, expressly states that the specimen in question was obtained alive at Port Jackson. With the same view, I may add, that the animal described and figured as the *Ph. Cookii* in M. Frederic Cuvier's "Mammifères," and again described by the same author in the Dict. des Sciences Naturelles, under the name of *Petaurus Cookii*, belongs to a very different species from either of those in question.

sum." Mr. Ogilby's observations in no degree altered the view which I had already taken, but satisfied me, that as our courses were diametrically opposite, we could not possibly interfere with each other; and I did not hesitate, when adding my notes to Mr. Gunn's communication, to publish my long-formed opinion on the subject of one of the species therein mentioned. I did not refer to Mr. Ogilby's observations, because (as they were then unpublished) I might have unconsciously misrepresented them, and I could have referred to them for no other purpose than that of controverting his views, a task which on all occasions I would if possible avoid. Neither did I refer to the specimens, of which there are three, in the collection of the British Museum, and that for the same reason as is stated for the same forbearance on the part of Mr. Ogilby himself, "because I was unacquainted with their precise habitat," the localities obtained from dealers being in most cases difficult of verification. That they are of the same species with that figured in Cook's Voyage, I never entertained a doubt, and the specific name of *Cookii* was consequently long since attached to one of them, which has been for several years in the collection: the only recent alteration has been to substitute in place of the paper label another painted one bearing my new generic name.

With respect to the "supposition" that this was done in consequence of a visit to the Museum of the Zoological Society, and a refreshment of my memory from the abstract of Mr. Ogilby's observations in the minute book of the Society, I have only to state, that I have not visited the Museum for some months, except on the Anniversary Meeting of the Society held therein on the 30th of April, the day on which Mr. Ogilby's communication was published in your last Number; that I have never inspected the minute book for this or any similar purpose; and further, that I have never seen Mr. Ogilby's name attached to the skins of either of the species of *Phalangista* in question, or to the mutilated portions of the skin of *A. Doria* in the Society's collection. If I have reproduced Mr. Ogilby's observations "almost word for word," one or other of us must have been singularly unfortunate in the choice of expressions, our views being so totally unlike; but I am wholly unconscious of any such coincidence; and it is not the least remarkable part of the "supposition," that I am at the same time accused of this extreme accuracy of memory, and of having entirely forgotten the only point in which I was immediately and personally interested.

Two other questions of nomenclature are introduced by Mr. Ogilby. The first of them has reference to my generic name for the group of

animals of which *Ph. Cookii* forms part, which he rejects because it is believed to be the native name of an animal not comprehended in that group. If all generic names (whether classical or barbarous) in the same predicament were to be rejected, how many new names would it not be necessary to introduce into the science in place of those given by the highest authorities! The other question has reference to my *Halmaturus Tasmanei*; and as Mr. Ogilby admits it is merely one of precedence, I leave it therefore on his own statement to the decision of those whom it may concern; observing only, that "previously" can in no way apply to the 28th of February in reference to the 10th of the same month in the same year, or to the 1st of May in reference to the 1st of April.

I regret to have been placed under the necessity of occupying so much of your valuable space on questions of little more than personal importance. I trust, however, that I have treated them without any exhibition of personal feeling, and it would give me sincere pleasure to find them met in a similar spirit.

Yours most sincerely,

JOHN EDWARD GRAY.

British Museum, 10th May, 1838.

XXXIV.—*Prodromus of a Monograph of the Radiata and Echinodermata.* By LOUIS AGASSIZ, D.M.*

[Continued from p. 43.]

I.

THE order *Fistulides* or the *Holothuriæ* contains but one family, which corresponds to the genus *Holothuria* of Linnæus, with the exception of those species which did not rightly belong there. Their body is soft, contractile, more or less elongated, beset with tentacula similar to those of the ambulacra of the *Echini*, and are sometimes arranged as regularly as in the latter. The mouth is situated at the anterior extremity of the body, surrounded by appendices, more or less ramified and fringed; the anus is placed towards the opposite extremity. Notwithstanding the elongated form of these animals, by which they more or less resemble worms, we perceive in the interior and even at the surface the radiated disposition of certain parts of their body, which are arranged in vertical bands, extending from the mouth to the posterior extremity. The numerous species which this division now contains renders it necessary to establish several genera, which

* Translated from the *Annales des Sciences Naturelles* for May 1837.

are however not yet well enough based to be admitted without reserve. Several of them I have not had occasion to examine myself.

1. SYNAPTA, Esch. (*Fistularia*, De Bl.—*Tiedemannia*, Leuck.—*Holothuria*, De Bl. sect. D.)—Body vermiform, presenting no difference between the upper and under surface; epidermis delicate; the mouth surrounded by large pinnatifid tentacula. Tubercles, for the most part crooked, and serve as feet, although the animal is not entirely destitute of vascular tubes.

S. Beselii, Jæg.—*S. oceanica*, Less.—*S. mammosa*, Esch.—*S. vittata*, Jæg.—(*Tiedemannia vitt.*, Leuck.)—*S. reciprocans*, Jæg.—(*Fistularia*, recipr., Forsk.—*Holothuria glutinosa*, Lam.)—*S. maculata*, Jæg. (Hol. mac., Cham.)—*S. radiosa*, Jæg. (Hol. rad., Regn.)—*S. inhærens*, Wieg. (Hol. inh., Mull.)

2. CHIRODOTA, Esch.—Epidermis thin, rather thicker however than in *Synapta*, beset with a small number of feet or merely of retractile mammillæ. Tentacula digitate.

Ch. purpurea, Less.—*Ch. lumbricus*, Esch.—*Ch. verrucosa*, Esch.—*Ch. discolor*, Esch.

3. THYONE, Oken. (*Mulleria*, Flem.) This genus differs from the preceding solely in having the entire body covered with retractile papillæ.

Th. papillosa (H. papill., Mull.)—*Th. fusus* (H. fus., Mull.)—*Th. impatiens* (B. imp., Forsk.)—*Th. maculata* (Hol. mac., Le S.)—*Th. Briareus* (Hol. Br., Le S.)—*Th. lapidifera* (H. lapid., Le S.)—*Th. peruviana* (H. peruv., Le S.).

4. TREPANG, Jæg.—Body subcylindrical; mouth anterior, surrounded by ten to twenty tentacula in a peltate head; feet confined to the belly. This genus is doubtful, and ought probably to be united to the *Holothuriæ* properly so called.

T. edulis (Hol. edul., Less.)—*T. ananas*, Jæg.

5. HOLOTHURIA, Linn.; De Bl. sect. B. (*Fistularia*, Lam.)—Body subcylindrical, anus rounded; mouth subinferior. Retractable tubes developed, especially under the belly.

H. tubulosa, Linn.—*H. columnæ*, Cuv.—*H. mazima*, Forsk.—*H. elegans*, Mull.—*H. Forskallii*, Delle Ch.—*H. Petagnii*, Delle Ch.—*H. Sanctorii*, Delle Ch.—*H. Cavolinii*, Delle Ch.—*H. Polii*, Delle Ch.—*H. Stellati*, Delle Ch.—*H. Dismarii*, Cuv.—*H. appendiculata*, De Bl.—*H. radackensis*, Cham.—*H. brunnea*, Cham.—*H. agglutinata*, Le S.—*H. umbrina*, Rupp. et Leuk.—*H. quadrangularis*, Less.—*H. fusco-cinerea*, Jæg.—*H. atra*, Jæg.—*H. fusco-punctata*, Jæg.—*H. lilla*, Less.—*H. scabra*, Jæg.—*H. monacaria*, Less.

6. MULLERIA, Jæg.—Back convex; belly flat; skin coriaceous; twenty tentacula peltate and disposed in two series round the mouth;

five teeth surrounding the anus, to which are attached the longitudinal muscles. In other respects it resembles *Holothuria*.

M. echinites, Jæg.—*M. Iecanora*, Jæg.

7. BOHADSCHIA, Jæg.—Differs from the genus *Mulleria* by the star-like form of the anus. This genus otherwise approaches closely to *Holothuria*.

B. marmorata, Jæg.—*B. ocellata*, Jæg.—*B. Argus*, Jæg.—*B. lineolata*, Jæg.—*B. albiguttata*, Jæg.

8. CUVIERIA, Peron.—Inferior surface flat and soft, furnished with a great number of feet; superior surface inflated, supported by bony scales, pierced in front by a starlike orifice, which is the mouth, and from which the tentacula proceed, on the under side by a round aperture, which is the anus.

C. Squammata (Hol. Squammata, Mull.).—*C. Cuvieri*, Jæg.

9. PSOLUS, Oken.—Back convex; belly flat; all the feet situated in the middle of the under part of the body; tentacula ramified, simple, not peltate. When the animal crawls, it raises its two extremities where the head and anus are situated, which are more contractile than the middle part, especially the anal extremity.

Ps. Phantopus (Hol. Ph., Linn.).—*Ps. appendiculatus* (Hol. appen., De Bl.).—*Ps. Timama* (Hol. Tim., Less.).

10. PENTACTA, Goldf. (*Cucumaria*, Cuv. et Jæg.)—Body cylindrical or oval-oblong; pedicules disposed in five series; tentacula pinnate or branchy.

P. crocea (Hol. croc., Less.).—*P. Pentactes* (Hol. Pent., Mull.).—*P. Gartneri* (Hol. Gärt., De Bl.).—*P. frondosa* (H. frond., Gun.).—*P. Dololium* (H. Dol., Pall.).—*P. tentaculata* (Hol. tent., Forst.).—*P. lævis* (Hol. læv., Fabr.).—*P. minuta* (Hol. min., Fabr.).—*P. pellucida* (Hol. pellucida, Mull.).

11. MINUTA, Cuv.—Body spheroidal, opened at both extremities, grooved like a melon at the two sides, which extend from the anus to the mouth, and which are formed of solid and corneous papillæ; mouth surrounded by three series of short, vermicular, and rounded tentacula. This genus and the preceding connect the *Holothuriæ* with the *Echinides*.

M. cyanea, Cuv. (*M. cœrulea*, Less.)

II.

The order of the *Echinides* is characterized by a solid shell, spheroidal, composed of adherent plates, and covered with moveable spines; all of them have a distinct mouth and anus. I divide them into three natural families, which are the *Spatangi*, the *Clypeastres*, and the *Cidarites*.

1. The *Spatangi* have the body more or less elongated and gibbous ; their mouth is furnished with jaws, and is placed towards the anterior extremity, and the anus towards the posterior extremity, sometimes on the upper surface of the disc, sometimes on the lower. Their shell is thin, covered with small tubercles, very numerous, among which are observed some larger ones, which are scattered and often perforated like those of the *Cidarites*. The spines are setaceous, often compressed, and of unequal size. The anterior ambulacrum is generally less developed than the rest ; they form round the mouth grooves, where the holes are larger and whence proceed ramified tentacula like those of the *Holothuriæ*. There are only four oviducal plates, which are very distinct.

1. **DISASTER**, Ag. (*Spatangus*, *Ananchytes*, et *Nucleolites*, auct.) The odd ambulacrum and those of the anterior pair converge at a point situated at a greater or less distance from the point of junction of the two posterior ambulacra. All the species of this genus are fossils of the chalk or of the jura.

D. bicornatus, Ag. (*Spatangus* bic., Goldf.)—*D. ellipticus*, Ag. (*Ananchytes* ellipt., Lam.)—*D. excentricus*, Ag. (*Nucleolites* excentr., Munst.)—*D. canaliculatus*, Ag. (*Nucleo. canal.*, Munst.)—*D. granulatus*, Ag. (*Nucleo. granul.* Munst.)—*D. capistratus*, Ag. (*Spat. capistr.*, Goldf.)—*D. carinatus*, Ag. (*Spat. carin.*, Goldf.)—*D. ovalis*, Ag. (*Spat. oval.*, Park.)—*D. analis*, Ag.—*D. ringens*, Ag. (these two latter from the Swiss Jura.)

2. **HOLASTER**, Ag. (*Spatangus*, auct.)—Disc heart-shaped ; ambulacra converging uniformly towards a point at the summit ; anus superior. All fossils, especially of the chalk.

H. granulatus, Ag. (*Spat. gran.*, Goldf.)—*H. hemisphæricus*, Ag. (*Spat. hemisph.*, Phil.)—*H. lævis*, Ag. (*Spat. læv.*, Deluc.)—*H. nodulosus*, Ag. (*Spat. nod.*, Dolf.)—*H. planus*, Ag. (*Spat. plan.*, Mant.)—*H. complanatus*, Ag. (*Spat. compl.*, De Bl.)—*H. intermedius*, Ag. (*Spat. interm.*, Munst.)—*H. subglobosus*, Ag. (*Spat. subgl.*, Leske.)—*H. suborbicularis*, Ag. (*Spat. suborb.*, DeFr.)—*H. truncatus*, Ag. (*Spat. trunc.*, Goldf.)

3. **ANANCHYTES**, Lam. and De Bl. (*Echinocorys*, Breyn. and Gray ; *Galea* and *Galeola*, Klein.)—Disc oval, no groove along the anterior ambulacrum ; anus oblong, placed longitudinally ; ambulacra converging uniformly towards the summit, where the double pores are very close, while they are widely apart at the circumference. All the species are fossils from the chalk ; they have been too much multiplied from mere differences of age.

A. ovata, Lam.—*A. gibba*, Lam.—*A. hemisphærica*, Al. Br.—*A. pustulosa*, Lam. is but the inner cast of *A. ovata*.—*A. quadriradiata*, Leske, is merely a monstrosity.

4. **HEMIRNEUSTES**, Ag. (*Spatangus*, auct.)—Disc heart-shaped,

anterior ambulacrum formed of minute equal pores; the lateral ambulacra formed each of two series of double pores, differing among themselves, the posterior series being much more marked than the anterior. One species, from the chalk.

II. radiatus, Ag. (*Spatangus rad.*, Lam.)

5. MICRASTER (*Spatangus*, auct.; *Brissoides*, Klein.; *Amygdala* and *Ovum*, V. Ph.).—Dorsal portion of the ambulacra highly developed and rather starlike; disc heart-shaped. The most part of the species are fossils from the chalk; there are some tertiary, and two living.

M. Amygdala, Ag. (Spat. Amygd., Goldf.)—*M. Bucklandii*, Ag. (Spat. Buckl., Goldf.)—*M. Bucardium*, Ag. (Spat. Bucard., Goldf.)—*M. Bufo*, Ag. (Spat. Bufo, Al. Br.)—*M. Cor. anguinum*, Ag. (Spat. Cor. Ang., Lam.)—*M. Cor. testudinarium*, Ag. (Spat. Cor. test., Goldf.)—*M. gibbus*, Ag. (Spat. gib., Lam.)—*M. Goldfusii*, Ag. (Spat. lacun., Goldf., non Gmel.)—*M. Prunella*, Ag. (Spat. Prun., Lam.)—*M. acuminatus*, Ag. (Spat. acum., Goldf.)—*M. suborbicularis*, Ag. (Spat. suborb., Munst.)—*M. canaliferus*, Ag. (Spat. canal., Lam.)—*M. lacunosus*, Ag. (Spat. lacun., Gmel., non Goldf.)

6. SPATANGUS, Klein and Gray. (*Echinospatangus*, Breyn.)—Disc heart-shaped; with a large, deep, anterior dorsal groove; the ambulacra of this groove are formed of minute equal pores, which, near the summit and at the circumference, present the form of a star. Besides the small spines, which are smooth on the back, there are some larger ones, but very slender. There are some fossil species from the chalk and tertiary deposits, and several living species.

Sp. ornatus, Al. Br.—*Sp. Desmarestii*, Munst.—*Sp. Hoffmanni*, Goldf.—*Sp. purpureus*, Leske.—*Sp. meridionalis*, Riss.—*Sp. ovatus*, Leske.—*Sp. Crus Andreæ*, Lam.—*Sp. planulatus*, Lam.

7. AMPHIDETUS, Ag. (*Echinocardium*, V. Ph. and Gr.—*Spatangus*, De Blainv., Sect. A.)—Disc heart-shaped, anterior dorsal groove deep, in which lies the odd ambulacrum, which is formed of minute pores, and is prolonged between the anterior ambulacra. The series of double pores which form the four ambulacral pairs are at a distance from each other towards the summit of the disc, and gradually approximate towards the periphery in the form of a star. The spines are very remarkable, the larger being arched and spatuliform at their extremity, the others are small and smooth. I know but of one fossil species from the chalk, and two living.

A. Goldfusii, Ag. (Spat. arcuarius, Goldf., non Lam.)—*A. Sebæ*, Ag. (*Echinocardium* Sebæ, Gr.)—*A. pusillus*, Ag. (Spat. pusillus, Leske.)

8. BASSUS, Kl. and Gr. (*Echinobrissus*, Breyn.—*Nuces*, V. Ph.—*Spatangus*, De Blainv., Sect. D.)—No anterior dorsal groove; odd

ambulacrum scarcely perceptible; the four ambulacral pairs depressed, forming at the summit of the disc a kind of cross, circumscribed by a sinuous line without tubercles or spines. I am not acquainted with any fossil species.

B. pectoralis, Ag. (*Spatangus Pect.*, Lam.)—*B. carinatus*, Leske.—*B. columbaris*, Lam.—*B. Scillæ*, Ag. (*Echinus Spatangus Scilla.*)—*B. unicolor*, Leske.—*B. ventricosus*, Leske.—*B. compressus*, Ag. (*Spat. compr.*, Lam.)—*B. sternalis*, Ag. (*Spat. stern.*, Lam.)

9. SCHIZASTER, Ag. (*Echinocardium*, V. Ph. and Gr.—*Spatangus*, de Bl. Sect. B.)—Disc heart-shaped, very much raised posteriorly; anterior dorsal groove long and deep; four other grooves at the dorsal summit deep and narrow, in which the ambulacra are hidden. One fossil species, and one living.

Sch. Atropos, Ag. (*Spat. Atr.*, Lam.)—*Sch. Studeri*, Ag. (from the Italian tertiary.)

II. The *Clypeastres* occupy the intermediate place between the *Spatangi* and the *Cidarites*; their form is most generally circular. The mouth is central or subcentral; but the anus is more or less approximated to the periphery, and is found sometimes at the upper surface, sometimes at the under surface of the disc.

1. CATOPYGUS, Ag. (*Nucleolites*, auct.)—Disc oval; ambulacra converging uniformly towards the summit; anus at the posterior surface. All the species are fossil, from the jura, chalk, and tertiary deposits.

C. semi-globosus, Ag. (*Nucleolites semi-gl.*, Munst.)—*C. carinatus*, Ag. (*Nucl. carin.*, Goldf.)—*C. castanea*, Ag. (*Nucl. cast.*, Al. Br.)—*C. pyriformis*, Ag. (*Nucl. pyrif.*, Goldf.)—*C. ovulum*, Ag. (*Nucl. ov.*, Lam.)—*C. depressus*, Ag. (*Nucl. depr.*, Al. Br.)—*C. subcarinatus*, Ag. (*Nucl. subcar.*, Goldf.)—*C. obovatus*, Ag.

2. PYGASTER, Ag. (*Nucleolites* and *Clypeus*, auct.)—Disc circular; ambulacra converging uniformly towards the summit; orifice of the anus large at the upper surface of the disc. Species all fossil, from the jura and chalk.

P. semisulcatus, Ag. (*Clyp. semisul.*, Phil.)—*P. depressus*, Ag. (*Nucl. depr.*, Munst.)

3. GALEMITES, Lam. (*Conulus*, Klein.—*Echinoclonus*, De Bl.)—Disc circular; ambulacra narrow, pierced with pores rather distant from one another, converging uniformly towards the summit; mouth central, anus marginal and inferior. Species all fossil, from the chalk. This genus approaches more to the *Nucleolites* and *Echinoneæ* than to the true *Echini*.

G. vulgaris, Lam.—*G. abbreviata*, Lam.—*G. subrotunda*, Mant.—(*G. quadrifasciata*, Burg., and *sexfasciata*, Deffr., are monstrosities.)

4. DISCOIDEA, Kl. and Gr. (*Conulus*, Leske.—*Echinodiscites*, V. Ph.—*Galerites*, Lam.)—Differs from the *Galerites* by the large ambulacra pierced with small pores at very short distances from one another. All the species are fossil, from the jura and chalk.

D. depressa, Ag. (*Galer. depr.*, Lam.)—*D. speciosa*, Ag. (*Gal. spec.*, Munst.)—*D. albo-galera*, Ag. (*Conulus albo-gal.*, Leske.)—*D. canaliculata*, Ag. (*Gal. canal.*, Goldf.)—*D. rotula*, Ag. (*Gal. rot.*, Al. Br.)—*D. rotularis*, Kl. (*Gal. rotul.*, Lam.)—*D. macropyga*, Ag.

5. CLYPEUS, Kl. (*Echinoclypeus*, De Bl.—*Echinosis*, V. Ph.—*Galerites*, Lam.—*Nucleolites*, De Fr.)—Disc circular, more or less flattened; ambulacra converging towards the apex and towards the periphery of the disc; anus superior and marginal. All the species are fossil, from the jura, chalk, and tertiary deposits.

Cl. sinuatus, Park.—*Cl. emarginatus*, Phil.—*Cl. patella*, Ag. (*Gal. pat.*, Lam.)—*Cl. orbicularis*, Phil.—*Cl. Sowerbii*, Ag. (*Nucleolites Sow.*, Deffr.)—*Cl. conoideus*, Ag. (*Echinoclyp. conoid.*, Leske.)—*Cl. hemispharicus*, Ag. (*Echinoclyp. hemisph.*, Leske.)—*Cl. testudinarius*, Ag. (*Nucl. testud.*, Munst.)—*Cl. scutella*, Ag. (*Nucl. scut.*, Goldf.)

6. NUCLEOLITES, Lam. (*Echinobrissus*, Breyn.—*Clypeus*, Phil.)—Disc oval or heart-shaped; ambulacra more prominent at the apex than at the periphery; they however do not form a petaloid star, as in the genus *Clypeus*. All are fossils from the jura, chalk, or tertiary deposits.

N. scutata, Lam.—*N. clunicularis*, Ag. (*Clyp. clunic.*, Smith.)—*N. dimidiata*, Ag. (*Clyp. dimid.*, Phil.)—*N. planata*, Röm.—*N. cordata*, Goldf.—*N. lacunosa*, Goldf.—*N. scorbiculata*, Goldf.—*N. Olfersii*, Ag.—*N. grignonensis*, Deffr.

7. CASSIDULUS, Lam. (*Nucleolites*, auct.)—Disc oval; ambulacra petaloid, anus between the summit and posterior margin. All are fossils from the chalk and tertiary deposits.

C. Lapis cancri, Lam.—*C. patellaris*, Ag. (*Nucl. patell.*, Goldf.)—*C. complanatus*, Lam.

8. FIBULARIA, Lam.—(*Echinocyamus*, Leske and Gr.—*Echinoneus*, Goldf.)—Shell spheroidal; circumference oval or subcircular; ambulacra petaloid; anus between the posterior margin and the mouth. The species are fossils of the chalk and tertiary deposits, and some recent.

F. placenta, Ag. (*Echinou. plac.*, Goldf.)—*F. subglobosa*, Ag. (*Echinou. subgl.*, Goldf.)—*F. ovata*, Ag. (*Echinou. ovat.*, Munst.)—*F. scutata*, Ag.

(*Echinon. scut.*, *Munst.*)—*F. suffulciensis*, Leach.—*F. cranioluris*, Linn., Gmel.—*F. ovulum*, Lam.

9. ECHINONRUS, V. Phels. and Lam. (*Echinanaus*, Koen.—*Echinocoenus*, Breyn.)—Disc oval, more or less flattened; ambulacra converging uniformly towards the summit; anus between the mouth and posterior margin. All the species are living.

E. cyclostomus, Lam.—*E. semilunaria*, Lam.—*E. gibbosus*, Lam.

10. ECHINOLAMPAS, Gray. (*Echinanthus*, Leake.—*Clypeaster* and *Galerites*, Lam.)—Disc oval or circular; front margin more or less sloped; ambulacra very large at the summit, where they form a star, the rays of which touch one another, but which gradually become more narrow towards the periphery; anus marginal, inferior. There are some fossil species from the jura, the chalk, and tertiary deposits, and one living.

E. pentagonalis, Ag. (Clyp. pentag., *Phil.*)—*E. fornicatus*, Ag. (Clyp. forn., *Goldf.*)—*E. globosus*, Ag. (Gal. glob., *Deifr.*)—*E. Koenigii*, Gr.—*E. Leskei*, Ag. (Clyp. Leak., *Goldf.*)—*E. Montmollini*, Ag.—*E. productus*, Ag.—*E. minor*, Ag.—*E. affinis*, Ag. (Clyp. aff., *Goldf.*)—*E. Bouei*, Ag. (Clyp. Bouei, *Munst.*)—*E. Brongniarti*, Ag. (Clyp. Brongn., *Munst.*)—*E. conoideus*, Ag. (Clyp. conoid., *Goldf.*)—*E. Cuvieri*, Ag. (Clyp. Cuv., *Munst.*)—*E. ellipticus*, Ag. (Clyp. ellipt., *Munst.*)—*E. hemisphaericus*, Ag. (Clyp. hemisph., *Lam.*)—*E. Kleinii*, Ag. (Clyp. Klein., *Goldf.*)—*E. Linkii*, Ag. (Clyp. Link., *Goldf.*)—*E. politus*, Ag. (Clyp. poll., *Lam.*)—*E. stelliferus*, Ag. (Clyp. stellif., *Lam.*)—*E. subcylindricus*, Ag. (Clyp. subcyl., *Munst.*)—*E. trilobus*, Ag. (Clyp. tril., *Deifr.*)—*E. orientalis*, Gr.

11. CLYPEASTER, Lam. (*Echinanthus*, Breyn. and Gr.)—*Echinodorum* and *Echinodiscus*, V. Phils.—(*Lagana*, Gr. and De Bl.)—Disc oval or subpentangular; ambulacra forming at the summit a large star, the rays of which are rounded at their extremity; anus inferior and marginal. The internal cavity is divided into chambers by vertical pillars. The shell is very thick. There are several fossil species from the tertiary deposits, and some living.

Cl. marginatus, Lam.—*Cl. altus*, Lam.—*Cl. Gaymardi*, Al. Br.—*Cl. Richardi*, Desm.—*Cl. rosaceus*, Lam.—*Cl. subdepressus*, Ag. (*Echinanthus* subdepr., Gr.)—*Cl. ambigenus*, De Bl.—*Cl. scutiformis*, Lam.

12. ECHINARACHNIUS, Leske and Gr. (*Arachnoides*, Kl.—*Echinodiscus* and *Lagana*, De Bl.—*Scutella*, Lam.)—Disc circular or subangular; ambulacra as in *Clypeaster*, from which this genus especially differs by the much flattened form of the shell, and by its thin margins; anus marginal. There is one fossil species from the tertiary beds, and several living.

E. lenticularis, Gr.—*E. placenta*, Gr. (Scut. plac., *Lam.*)—*E. Parma*, Gr.

(Scut. Parm., Lam.)—*E. placunarius*, Ag. (Sent. placun., Lam.)—*E. latissimus*, Ag. (Scut. latissima, Lam.)—*E. Rumphii*, Ag. (Echinodis. Rumph., De Bl.)

13. **SCUTELLA**, Lam. and De Bl. (*Echinodiscus*, Leske and Gr.—*Mellita* and *Rotula*, Kl.—*Lagana*, De Bl.)—Shell flattened, circular, margins thin; ambulacra as in *Clypeaster*, but in proportion larger; anus inferior. The species are very numerous, some fossils of the tertiary formation, and some living.

Sc. altavillensis, Defr.—*Sc. gibberula*, M. de S.—*Sc. hispanica*, Defr.—*Sc. nummularia*, Defr.—*Sc. occianta*, Defr.—*Sc. striatula*, M. de S.—*Sc. subrotunda*, Lam.—*Sc. porpita*, Bory.—*Sc. orbicularis*, Lam.—*Sc. ovalis*, Ag. (Lag. oval., Brug.)—*Sc. integra*, Brug.—*Sc. inaurita*, De Bl.—*Sc. aurita*, De Bl.—*Sc. dentata*, Lam.—*Sc. radiata*, Seba.—*Sc. digitata*, Lam.—*Sc. octodactyla*, De Bl.—*Sc. hexapora*, De Bl.—*Sc. pentapora*, De Bl.—*Sc. bipora*, Lam.—*Sc. tetrapora*, De Bl.—*Sc. emarginata*, Lam.

III. The *Cidarites* constitute a family, the most prominent character of which is the spheroidal form of the shell, which is beset with two kinds of spines; the first larger, situated on large mammillæ; the others smaller, surrounding the base of the first, or covering the ambulacra. The mouth is central, at the inferior surface of the disc; the anus, which is diametrically opposite to it, is situated at the summit of the disc, and opens between the small laminæ surrounding it, opposite and sometimes very near to the posterior ambulacral space.

1. **CIDARIS**, Lam. and Auct.—Ambulacra narrow, covered with small, compressed spines, interambulacral spaces large, each of their plates being surmounted with one large perforated tubercle bearing a great spine, around which are several small ones. There are a great number of species, fossils from the jura, chalk, and tertiary deposits, as also many living ones.

C. Blumenbachii, Munst.—*C. Buchii*, Munst.—*C. coronata*, Goldf.—*C. crenularis*, Lam.—*C. elegans*, Munst.—*C. florigemma*, Phil. (*C. elongata*, Rœm.)—*C. glandifera*, Goldf.—*C. marginata*, Goldf.—*C. maxima*, Munst.—*C. monilifera*, Goldf.—*C. muricata*, Rœm.—*C. nobilis*, Munst.—*C. propinqua*, Munst.—*C. Schmidelii*, Munst.—*C. spinulosa*, Rœm.—*C. regalis*, Goldf.—*C. clavifera*, Kœn.—*C. corollaris*, Mant.—*C. cretosa*, Mant.—*C. clunifera*, Ag.—*C. vesiculosa*, Goldf.—*C. limaria*, Bronn.—*C. discus*, Bronn.—*C. rosaria*, Bronn.—*C. serraria*, Bronn.—*C. hystrix*, Lam.—*C. baculosa*, Lam.—*C. tribuloides*, Lam.—*C. verticillata*, Lam.—*C. tubaria*, Lam.—*C. bispinosa*, Lam.—*C. annulifera*, Lam.—*C. metularia*, Lam.—*C. stellulifera*, Bory.—*C. imperialis*, Lam.—*C. granioides*, Lam.—*C. pistillaris*, Lam.

2. **DIADEMA**, Gray. (*Cidarites*, Lam.)—Shell more or less flattened; ambulacra large, converging uniformly towards the summit. The

spines are often tubular. The tubercles of the ambulacral plates, although equally perforated, are smaller and more numerous than in *Cidaris*. There are fossil species from the jura and chalk, and many recent.

D. Bechei, Ag. (Cid. Bech., Brader.)—*D. subangulare*, Ag. (Cidarit. subang., Goldf.)—*D. vagans*, Ag. (Cidaris vag., Phil.)—*D. mammillanum*, Ag. (Cidarit. mam., Ræm.)—*D. hemisphæricum*, Ag. (Jura.)—*D. transversum*, Ag. (Jura.)—*D. variolare*, Ag. (Cidarit. variol., Al. Br.)—*D. granulolum*, Ag. (Cidarit. granul., Goldf.)—*D. ornatum*, Ag. (Cidarit. orn., Goldf.)—*D. rotulare*, Ag.—*D. setosum*, Gr.—*D. calamarium*, Gr.—*D. spinosissimum*, Ag. (Cidarit. spinos., Lam.)—*D. subulare*, Ag. (Cidarit. subul., Lam.)—*D. pulvinatum*, Ag. (Cidarit. pulvin., Lam.)

3. *ASTROPYGA*, Gray. (*Cidarites*, Lam.)—Shell flattened; ambulacra large, and converging uniformly towards the summit; oviducal plates very long, lanceolate; several vertical series of spines on the interambulacral spaces. One living species only.

A. radiata, Gray.

4. *SALENTA*, Gr. (*Cidarites*, auct.)—This genus resembles that of *Cidaris* by the disposition of the ambulacral plates, but they bear a large mammilla, whose summit is not perforated. Around the anus, instead of small moveable laminæ, there are large scutelli (écussons) articulated at their margins. The oviducal plates are also very large. All the species are fossils, from the jura, or chalk.

S. Hoffmanni, Ag. (Cidarit. Hoffm., Ræm.)—*S. hemisphærica*, Ag. (Cidarit. hemisph., Ræm.)—*S. scutigera*, Gr.—*S. peltata*, Ag.

5. *ECHINOMETRA*, Breyn., V. Phels., and Gr. (*Echinus*, auct.)—Shell oval transversely and obliquely to the longitudinal axis, more or less flattened; large tubercles on the interambulacral spaces, bearing spines of very varied forms. Mr. Gray thought he perceived in the obliquity of the ambulacra an objection to the bilateral arrangement which I had observed in the Echinodermata; but this is merely one example more of the want of symmetry notwithstanding the similarity of the parts, as is found in most Mollusca. M. Wiegmann, in return, has very well observed, that their longitudinal diameter is shorter than the transversal. The species belonging to this genus are all recent.

E. atrata, Gr.—*E. aculeata*, De Bl.—*E. carinata*, De Bl.—*E. Leske-nautii*, De Bl.—*E. lobata*, De Bl.—*E. Lucunter*, Gr.—*E. Mathai*, De Bl.—*E. mammillata*, Gr.—*E. Mauget*, De Bl.—*E. oblonga*, De Bl.—*E. pedifera*, De Bl.—*E. Quoyii*, De Bl.—*E. trigonaria*, De Bl.

6. *AMRACIA*, Gray. (*Echinus*, auct.)—True *Echini*, similar to the *Diadema*, but the tubercles are not perforated. Ambulacral spaces

narrow; ambulacra straight and simple, or each formed of two series of double pores. The fossil species are from the jura, chalk, and tertiary deposits. There are also some recent.

A. hieroglyphica, Ag. (Echi. hierogl., Goldf.)—*A. sulcata*, Ag. (E. sulc., Goldf.)—*A. nodulosa*, Ag. (E. nod., Munst.)—*A. granulosa*, Ag. (E. gran., Munst.)—*A. alutacea*, Ag. (E. alut., Goldf.)—*A. radiata*, Ag. (E. rad., Hæn.)—*A. pusilla*, Ag. (E. pusil., Munst.)—*A. punctulata*, Gr.—*A. pustulosa*, Gr.

7. ECHINUS, Linn. and Auct.—Ambulacra composed of segments of arcs formed by several pairs of pores, and converging uniformly towards the summit; disc circular or subangular, very regular. There are fossil species from the jura, chalk, and tertiary deposits, as also a great number of living ones.

E. germinans, Phil.—*E. perlatus*, Desm.—*E. lineatus*, Goldf.—*E. Menardi*, Desm.—*E. Milleri*, Desm.—*E. regalis*, Hæn.—*E. ventricosus*, Lam.—*E. scardicus*, Lam.—*E. pentagonus*, Lam.—*E. Peleolus*, Lam.—*E. variegatus*, Lam.—*E. esculentus*, Linn.—*E. vulgaris*, De Bl.—*E. lividus*, Lam.—*E. variolaris*, Lam.—*E. melo*, Lam.—*E. miliaris*, Lam., &c.

[To be continued.]

XXXV.—*Descriptions of British Chalcidites.* By FRANCIS WALKER, F.L.S.

INSECTA TETRAPTERA NECROMORPHA.

Class HYMENOPTERA.

Stirps Ichneumonina.

Order Chalcidites.

Genus *Cirrospilus*, Westwood.

Fem. Corpus lineare, angustum, sat longum, parum convexum, nitens, scitissime squameum, parce hirtum: caput transversum, breve, parvum, thorace angustius; vertex angustus; frons impressa abrupte declivis: oculi mediocres, subrotundi, extantes: ocelli vertice triangulum fingentes: antennæ clavatæ, corporis dimidio certe breviores; articulus 1^{us} validus, 3^{us} brevissimus, 4^{us} mediocris, 5^{us} brevior et latior; clava longiovata, apice acuminata; 5^o latior et plus duplo longior: thorax longiovatus: prothorax bene determinatus, subtrigonus, transversus, postice latus incurvus: mesothoracis scutum subquadratum, longitudine paullo latius, postice angustius, latera basi incurva; parapsidum suturæ vix conspicuæ; scutellum obconicum; postscutellum transversum, breve, lunatum, apud latera læve: metathorax transversus, sat bene determinatus: petiolus crassus, brevissimus: abdomen ovatum, depressum, subtus convexum, fere glabrum, thorace paullo brevius non latius; segmenta transversa, 1^{um} magnum læve micans, 2^{um} et sequentia ad 6^{um} breviora, subæqualia; pedes sat longi, graciles, subæquales; coxæ parvæ; femora subclavata; tibiæ rectæ; tarsis articulus 1^{us} brevis,

2^m et 3^m longiores, 4^m adhuc longior; pulvilli sat magni: alæ amplæ, pubescentes, vix ciliatæ: proalis nervus solitus costæ dimidio paulo longior: ulnaris humerali non brevior, cubitalis longus in alæ discum declivis, radialis nullus, stigma minutum: metalis nervus unicus simplex costæ dimidio longior.

Sp. 1. *Cirr. vittatus* (*Curtis' Guide*). Fem. *Flavus viridi varius, antennæ fulvæ, thorax viridi vittatus, pedes flavi, alæ limpidæ.*

Læte flavus: fascia utrinque ad caput posticum arcuata viridis: fascia quoque antica inter oculos brevis: oculi et ocelli rufi: antennæ pallide fulvæ; articuli 1^m et 2^m supra virides, basi apice et subtus flavi; clava pallide fusca: thorax flavus, cupreoviridi trivittatus: vitta media integra lata, vittæ laterales interruptæ contortæ: metathoracis dorsum viridicupreum: pectoris et ventris disci pallide fuscii: abdomen flavum; discus supra atro utrinque incisus, basi æneus; pedes læte flavi; tarsi apice fulvi; protarsi pallide fulvi: alæ limpidæ; squamulæ flavæ, viridi maculatæ; nervi flavi. (Corp. long. lin. $\frac{1}{4}$ —1; alar. lin. $\frac{1}{4}$ —1 $\frac{1}{4}$.)

Var. β.—Antennis articulus 1^m supra viridi punctatus; 2^m viridis, apice et subtus flavus; clava fulva, basi supra fusca: abdominis discus nigro-æneus.

Var. γ.—Antennis clava fulva, basi supra fusca: abdomen supra atrum; segmento cuique macula lateralis trigona flava: protibiæ extus fulvæ.

Var. δ.—Caput anticum omnino flavum: antennæ flavæ; articulus 1^m supra fusco maculatus; 2^m fuscus, apice et subtus flavus; clava fulva, basi supra fusca: thoracis vittæ cyaneovirides, laterales perangustæ: metathorax cyaneoviridis.

Var. ε.—*Var. δ.* similis: capitis fasciæ interruptæ.

Var. ζ.—Capitis fasciæ vix conspicuæ: antennæ flavæ; articulus 1^m pallide flavus; 2^m basi fulvus: thoracis vitta media latissima: abdominis discus seneofuscus.

Var. η.—Caput omnino flavum: antennæ flavæ; articulus 1^m supra viridi maculatus; 2^m viridis, apice et subtus flavus; clava fulva: thoracis vittæ virides, media perangusta, laterales fere obsoletæ: metathoracis discus viridis: abdomen flavum; disco fasciæ 5 abbreviatæ nigroæneæ plerumque connexæ.

May to September; near London, Isle of Wight, Wales, Ireland, Mr. Haliday.

Fem. Corpus angustum, sublineare, sat longum, parum convexum, nitens, scitissime squameum, parce hirtum: caput transversum, parvum, brevissimum, thorace fere angustius; vertex latus; frons impressa, abrupte declivis: oculi sat magni, subrotundi, extantes: ocelli vertice triangulum singentes, media perparum anteposita: antennæ clavatæ, prope os insertæ, corporis dimidiæ fere breviores; articulus 1^m longus, sublinearis, sat validus; 2^m anodiocria, longiclyathiiformis; 3^m brevissimus; 4^m linearis, 2^o vix longior; 5^m brevior et latior; clava longiovata, acuminata, 5^o latior et fere duplo longior: thorax longiovatus, convexus: prothorax transversus, sat bene determinatus, antice abrupte acuminatus, postice latus incurvus: mesothoracis

scutum longitudine paullo latius; parapsidum suturæ remotæ, bene determinatæ; paraptera et epimera magna; scutellum subovatum; postscutellum transversum: metathorax brevis: petiolus brevissimus latissimus: abdomen longiovatum, supra depressum, subtus convexum, apice acuminatum, thoraci quoad longum ac latum; segmentum 1^{um} magnum, basi læve, 2^{um} et sequentia ad 7^{um} breviora, transversa, parallela, subæqualia: pedes graciles, pubescentes, simplices, subæquales; coxæ parvæ; femora subclavata; tibiæ rectæ; tarsis articulus 1^{us} brevis, 2^{us} et 3^{us} longiores, 4^{us} adhuc longior; pulvilli magni: alæ amplæ, pubescentes, non ciliatæ: proalis nervus hirtus costæ dimidio paullo longior, ulnaris humerali vix brevior, cubitalis longus, radialis brevissimus; stigma minutum: metalis nervus simplex costæ dimidio longior.

Sp. 2. *Cirr. Thasus. Fem. Viridis flavorarius, antennæ fulvo-fuscae, pedes flavi fusco et nigro cincti, alæ limpidae.*

Cyaneoviridis: caput antice et circum oculos læte flavum, postice nigro-æneum: oculi et ocelli rufi: antennæ fuscæ, ad apices subtus et utrinque fulvæ; articuli 2^{us} apice 3^{us} que omnino fulvi: gula fulva: thoracis suturæ æneæ: mesothoracis parapsides flavæ, antice nigro plagiatae; scutum postice et utrinque flavum; scutellum æneoviride; postscutellum cupreum: abdomen cupreum: pedes læte flavi, coxæ virides; tarsi apice fusci; protibiæ extus fulvæ; mesotibiæ basi supra fusco maculatæ; protarsi fulvi: alæ limpidae; squamulæ flavæ; nervi flavi. (Corp. long. lin. $\frac{1}{2}$ —1 $\frac{1}{4}$; alar. lin. $\frac{1}{2}$ —2.)

Var. β.—Antennæ obscure fuscæ, subtus et apice pallidiores; articulus 2^{us} apice fulvus: prothorax cupreoviridis, latera flava: mesothoracis scutellum cupreo-æneum: metathorax cupreus.

Var. γ.—Abdomen basi viride.

Var. δ.—*Var. β.* similis: metathorax viridis: abdominis segmenti 1ⁱ anguli postici flavo maculati.

Var. ε.—Capitis vertex posticus flavo interrupte fasciatus: prothoracis latera flava; mesothoracis scutellum cupreum.

Var. ζ.—Capitis fascia postica integra flava; antennæ obscure fuscæ, apice et subtus pallidiores; articulus 2^{us} apice fulvus: thorax æneoviridis; mesothoracis scutellum cupreum.

Var. η.—Mesothoracis scutellum et postscutellum cuprea: abdomen æneoviride.

Var. θ.—Capitis fascia postica interrupte flava; antennæ fulvæ; articulus 1^{us} læte flavus, apice fulvus; 2^{us} basi supra fuscus: prothoracis latera flava: abdominis latera ante medium flavo plagiata.

Var. ι.—Caput supra viride: oculi antice flavocincti: thorax æneo viridis: mesothoracis scuti vittæ obsoletæ, fascia postica perangusta: meso et meta-femora basi nigro cincta; mesotibiæ late nigro cinctæ; metatibiæ basi fulvo cinctæ.

Var. κ.—*Var. ι.* similis: scuti fascia postica disco interrupta; scutellum purpureo-cupreum: meso et metafemora basi supra fusco plagiata.

Var. λ.—Caput omnino viride: antennæ fuscæ, apice et subtus pallidiores: thorax viridis; mesothoracis scutellum purpureum: abdomen cupre-

um : meso et metafemora basi nigro cincta : mesotibiæ late nigro cinctæ ; metatibiæ basi fulvo cinctæ.

Var. µ.—*Var. θ.* similis : caput et prothoracis latera omnino viridia : abdomen cupreum.

June to September ; on oak trees, &c., near London, Isle of Wight, Wales, Cornwall, Ireland, Mr. Haliday.

Mas. Caput thorace fere angustius : antennæ subclavatæ, corporis dimidio longiores ; articulus 2^{us} longiovatus ; 3^{us} brevissimus ; 4^{us} 2^o multo longior ; 5^{us} 4^o paullo brevior et latior ; clava longiovata, articulo 5^o duplo longior et paullo latior : abdomen ovatum, depressum, thorace brevius et fere angustius ; segmentum 1^{um} magnum ; 2^{um} et sequentia brevia, transversa, subæqualia.

Fem. C. Thasi statura.

Sp. 3. Cirr. elegantissimus, *Mas.* et *Fem.* *Flavus viridi et cupreo varius, antennæ mari flavæ, fem. fulvæ, pedes flavi, alæ sæpissime limpideæ.*

Cirrospilus elegantissimus, *Westwood, Lond. and Edinb. Phil. Mag., Third Series, i. 2. 128.*

Mas. Læte flavus : capitis vertice fascia viridis ocellis confinis : oculi et ocelli rufi : antennæ flavæ ; articulus 2^{us} basi fulvus ; 5ⁱ et 6ⁱ ligamenta fulva : thoracis discus viridis : mesothoracis scutum cupreoviride : petiolus fulvus : abdomen apice viridicupreum : sexualia pallide fusca : pedes læte flavi ; tarsi apice fulvi : alæ limpideæ ; squamulæ flavæ ; nervi flavi.

Fem. Caput læte flavum ; vertici vitta abbreviata viridia, ocellis confinis ; macula postica utrinque nigra magna : antennæ fulvæ ; articulus 1^{us} flavus, supra fuscus ; 2^{us} flavus, basi fuscus ; 3^{us} et sequentes supra pallide fusci : thorax læte viridis : prothorax subtus et utrinque flavus : mesothoracis scutum apice cupreum ; parapsides flavæ ; scutellum cupreum, basi viride ; paraptera et epimera flava ; postscutellum micans, apice cupreum : abdomen flavum, supra nigrosæneum ; latera antica flava ; segmentum 1^{um} flavum, cyaneoviridi varium : pedes flavi ; coxæ basi virides ; ungues et pulvilli pallide fusci : alæ fulvo tinctæ. (Corp. long. lin. $\frac{1}{4}$ — $\frac{1}{2}$; alar. lin. 1—24.)

Var. β. Mas.—Antennis articulus 2^{us} basi flavus : thorax supra omnino viridis : mesothoracis scutellum cupreum : abdomen basi supra viridi biplagiatus ; dimidium posticum viridicupreum.

Var. γ. Mas.—*Var. β.* similis : mesothoracis parapsides fere omnino flavæ : abdomen flavum, apice cupreoviride.

Var. δ. Mas.—*Var. β.* similis : abdomen basi fuscoviride.

Var. ε. Mas.—Thorax supra cupreoviridis : mesothoracis scutellum cupreum : abdomen basi fulvum ; dimidium posticum cupreum : protibiæ extus fulvæ.

Var. ζ. Mas.—Thorax supra viridis : mesothoracis parapsides flavæ ; scutellum cupreum : abdomen cupreum, basi viride, ante medium fulve cinctum.

Var. η. Fem.—Antennis articulus 1^{us} supra et 2^{us} basi nigrofusci : mesothoracis scutum apice viride : postscutellum cupreum : abdomen apice subtus viride ; segmenti 1ⁱ discus viridis.

Var. θ. Fem.—Antennis articuli 3^{us} et sequentes fulvi, subtus flavi ; meso-

thoracis scutum et postscutellum cuprea: metathorax cupreoviridis: abdomen subtus flavum, apice et supra cupreoviride; segmentum 1^{um} viride, utrinque flavum, apice cupreum.

Var. ι. Fem.—Capitis maculæ posticæ maximæ, connexæ: mesothoracis paraptera viridia: abdomen cupreoviride, subtus basi ferrugineo varium.

Var. κ. Fem.—Abdomen cupreum, subtus basi ferrugineum; segmentum 1^{um} viridi micans.

Var. λ. Fem.—Antennis articuli 3^{us} et sequentes flavi, supra fulvi: mesothoracis scutum et scutellum viridicyanea, hujus discus cupreus: abdomen nigrocupreum, subtus fulvum, apice viride; segmentum 1^{um} basi viridi micans.

Var. μ. Fem.—Mesothoracis scutellum et postscutellum cuprea: abdomen viridicupreum, basi et subtus fulvum; segmentum 1^{um} basi læte viridicyaneum.

Var. ν. Fem.—Capitis maculæ posticæ connexæ: mesothoracis scutum viridicupreum: abdomen viridicupreum, basi læte viride, subtus nisi ad apicem cupreum: alæ limpidæ.

Var. ξ. Fem.—Prothorax supra viridis; anguli postici flavi: abdomen supra et apice cupreoviride; alæ limpidæ.

Var. ο. Fem.—*Var. ξ.* similis: mesothoracis scutum, scutellum et postscutellum cyaneoviridia.

Var. π. Fem.—*Var. ο.* similis: capitis maculæ posticæ connexæ: prothorax omnino viridis: mesothoracis paraptera et epimera plerumque viridia.

Var. ρ. Fem.—*Var. π.* similis: mesothoracis scutum et scutellum cuprea.

Var. σ. Fem.—*Var. π.* similis: mesothoracis parapsides plerumque virides, scutellum et postscutellum cuprea: alæ fulvæ.

Var. τ. Fem.—Capitis maculæ posticæ latæ connexæ: thorax supra viridis; discus cupreus: abdomen cupreum, basi viride: alæ limpidæ; proalis discus fulvescens.

May to October; on oaks, &c. near London, Cumberland, Ireland, Mr. Haliday.

Sp. 4. *Cirr. Salatis, Fem. Cupreus, antennæ fuscae, pedes flavi fusco maculati, alæ limpidæ.*

Cupreus: oculi et ocelli rufi: antennæ fuscae, apice et subtus pallidiores; articulus 1^{us} nigroæneus: pedes læte flavi; femoribus et tibiis vittæ abbreviatæ fuscae; protibiis extus fuscae; protarsi fusci; meso et metatarsi pallide fulvi, apice fusci, basi et subtus flavi: alæ limpidæ; squamulæ piceæ; nervi pallide flavi. (Corp. long. lin. 3—4; alar. lin. 1—1½.)

Var. β.—Femora cupreopicea, apice flava; tarsi flavi, apice fusci; pro-pedes tibiis tarsisque fulvis; mesotibiis fulvo maculatæ; metatibiis piceo cinctæ.

Found near London.

Fem. Corpus nitens, scitissime squameum, parce hirtum: caput parvum, transversum, breve, convexum, thorace angustius; vertex sat latus; frons abrupte declivis: antennæ clavatæ, thorace breviores; articulus 1^{us} gracilis,

sublinearis; 2^{us} longicyathiformis; 3^{us} longus, sublinearis; 4^{us} brevior; clava longiovata, acuminata, articulo 5^o fere duplo longior: thorax ovatus, convexus: prothorax transversus, brevissimus, supra conspicuus: mesothoracis scutum longitudine latius; parapsidum suturæ remotæ, conspicuæ; scutellum magnum, obconicum; paraptera et epimera distincta: metathorax transversus, bene determinatus: petiolus crassus, brevissimus: abdomen ovatum, planum, thoraci fere quoad longum ac latum; segmentum 1^{um} magnum; 2^{um} et sequentia breviora, transversa, subæqualia: pedes graciles; tarsis articulus 1^{us} brevis, 2^{us} et 3^{us} longiores, 4^{us} adhuc longior: alæ latæ; nervus ulnaris humerali vix brevior, cubitalis longus, radialis brevissimus.

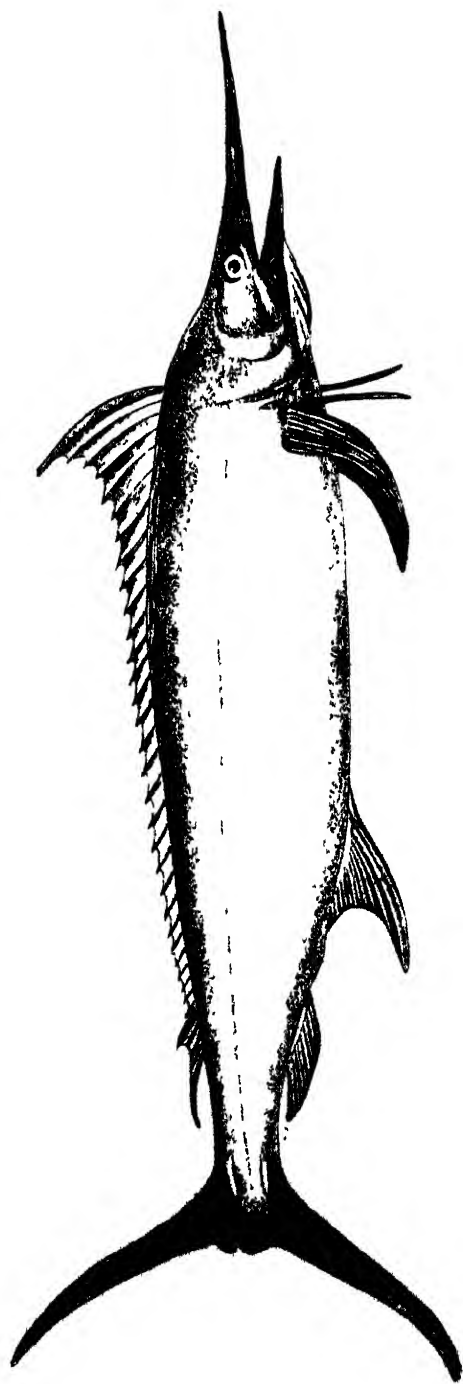
Sp. 5. Cirr. Diallus, Fem. *Cyaneoviridis*, abdomen nigrocupreum, antennæ fulvæ, pedes flavi, alæ limpide.

Cyaneoviridis: caput supra apud oculos flavum: oculi et ocelli rufi: antennæ fulvæ; articuli 1^{us} et 2^{us} fusi, hic apice fulvus: gula pallide flava: abdomen nigrocupreum: pedes læte flavi; coxæ virides; ungues et pulvilli fulvi: proalæ cuique disco macula obsoleta flava: squamulæ flavæ; nervi flavi. (Corp. long. lin. $\frac{3}{4}$; alar. lin. $1\frac{1}{2}$.)

Found near London.

Fem. Corpus angustum, sublineare, sat longum, parum convexus, nitens, scitissime squameum, parce hirtum: caput transversum, parvum, brevissimum, thorace fere angustius; vertex latus; frons impressa, abrupte declivis: oculi sat magni, subrotundi, extantes: ocelli vertice triangulum fingentes, media perparum anteposita: antennæ subclavatæ, pubescentes, prope os insertæ, corporis dimidio vix breviores; articulus 1^{us} longus, gracilis, subfusiformis; 2^{us} longicyathiformis; 3^{us} et 4^{us} brevissimi; 5^{us} longus, sublinearis; 6^{us} paullo latior et brevior; clava triarticulata, fusiformis, acuminata, 6^o paullo latior et fere duplo longior: thorax ovatus, convexus: prothorax transversus, sat bene determinatus, antice abrupte acuminatus, postice latus incurvus: mesothoracis scutum longitudine paullo latius; parapsidum suturæ remotæ, bene determinatæ; paraptera et epimera magna; scutellum subovatum; postscutellum transversum: metathorax brevis; petiolus crassus, brevissimus: abdomen longiovatum, supra depressum, subtus carinatum, apice attenuatum et acuminatum, thorace paullo longius et angustius; segmentum 1^{um} magnum, basi læve; 2^{um} et sequentia ad 7^{um} breviora, transversa parallela, subæqualia: oviductus abdominis basin versus apparens, subexertus; vaginæ pubescentes: pedes graciles, pubescentes, simplices, subæquales; coxæ parvæ; femora subclavata; tibiæ rectæ; tarsis articulus 1^{us} brevis, 2^{us} et 3^{us} longiores, 4^{us} adhuc longior; pulvilli magni; alæ amplæ, pubescentes, non ciliatæ: proalis nervus hirtus costæ dimidio paullo longior, ulnaris humerali vix brevior, cubitalis longus, radialis brevissimus, stigma minutum; metali nervus simplex costæ dimidio longior.

Mas. Caput juxta thoraci latum: antennæ extrorsum crassiores, corporis dimidio longiores; clava articulo 6^o duplo longior: abdomen conicum, thorace brevius et angustius.



Tetrapturus lineatus (Cuv.)

Marine & Gray sc

XXXVI.—*Description of a new Species of Tetrapturus from the Cape of Good Hope.* By JOHN E. GRAY, Esq., F.R.S., Senior Assistant in the Zoological Department of the British Museum.

[With a Plate.]

CUVIER in his History of Fish describes a species of this genus from the coast of Sicily, first noticed by M. Rafinesque, and which my friend the Prince Charles L. Bonaparte informs me is found along the whole coast of Italy; and indicates two others, one from Sumatra, suggested by a note from M. Broussonnet; and the other founded on the *Makiara* of Lacépède, which is probably only a specimen of *Tetrapturus Belone*, in which the observer had overlooked the ventral fins.

The specimen I am about to describe, which greatly resembles Lacépède's figure of the *Makiara*, was brought to this country last year by Mr. Smuts, the author of a work on the Mammalia of the Cape, and sold by him to the Trustees of the British Museum, where it forms one of the chief ornaments of the Ichthyological collection. Besides differing very considerably in the thickness and proportionate shortness of the body from the species figured by Cuvier (Hist. Poiss. viii. p. 228), it has one peculiarity which at once distinguishes it from the Mediterranean species; as I cannot suppose that it could have escaped the attention of M. Bibron, who made a dissection of the specimen, if it had existed in that species. The skin of the Cape species is strengthened with numerous elongate-lanceolate flexible bones, varying from two to three inches in length, and sometimes united together by their outward surface. The fish having been discovered during the visit of Sir John Herschel at the Cape, I have named it in honour of him,

Tetrapturus Herschelii. The upper beak elongate; the skin strengthened with bony spicula. Inhab. Table Bay, Cape of Good Hope. (Plate X). The specimen when stuffed is nearly 11 feet long; the beak to the gape is 2' 8"; the lower jaw to the gape, 1' 3"; the pectoral fin, 1' 9"; the ventral fin, which is imperfect, 9 inches; the crescent of the tail is 4 feet 10 inches long. The first dorsal fin has 11 soft and 29 spinous rays, and the second 7 rays.

The dorsal and anal fins are furnished with a deep fold on each side, between which they must be completely hidden when folded down.

A tail, which appears to have belonged to a larger specimen of this species, has been for many years in the collection of the British Museum.

BIBLIOGRAPHICAL NOTICES.

The Zoology of the Voyage of H.M.S. Beagle, under command of Capt. Fitzroy, during the years 1832 to 1836. (Published with the approval of the Lords Commissioners of Her Majesty's Treasury.)

Edited and superintended by Charles Darwin, Esq., M.A., F.G.S.

Part I. No. I. *Fossil Mammalia*. By Richard Owen, Esq. 4to. London, Smith, Elder, and Co., 1838.

It has been long the practice on the continent for the government to defray a part or the whole of the expense of publishing and illustrating the accounts of the various voyages and expeditions undertaken for discovery or other purposes connected with science. In Britain, we believe, that until the publication of the Northern Zoology by Richardson and Swainson, little encouragement was thus given to works of a similar kind, and in consequence, an enormous price was set on them, which limited their circulation nearly to the public libraries or to those of the most wealthy followers of science and literature. But we are happy now to perceive that this same plan of encouragement has been still further pursued, and in the instance of two expeditions, one undertaken publicly, the other by a private individual, the Lords of the Treasury have come forward to assist in defraying the expense of the illustrations; this we are sure will be attended with the best results for science, and we would only strongly insist that proper precautions should always be used to secure the excellency of the work and the cheapness of it to the public. In regard to that now before us, we are well satisfied in one respect; but although the first number is certainly cheap, in proportion to the run of prices of modern books, yet it will depend on that of the future numbers whether as a whole it will be available to the general reader. Having thus shortly noted our opinion on the plan now adopted for the promotion and assistance of science, we shall endeavour to give an analysis of the part which has at this time appeared.

In July 1831, H.M. ship Beagle was commissioned for the purpose of surveying the southern parts of America, and afterwards circumnavigating the world, and Mr. Darwin was appointed naturalist to the expedition. On returning to Britain the collections procured during the voyage proved to be valuable and interesting, and many of them entirely new to science; and "the object of the present work is to give descriptions and figures of undescribed or imperfectly known animals, both fossil and recent, together with some account, in the one case of their geological position, and in the other

of their habits and ranges." And it is at the same time modestly added, "As I do not possess the knowledge requisite for such an undertaking, several gentlemen have most kindly undertaken different portions of the work." To Mr. Owen has been deputed the description of the fossil mammalia; to Mr. Waterhouse those of the recent mammalia; to Mr. Gould the birds; Mr. Bell the reptiles; and the fishes to the Rev. L. Jenyns. The first part, as our title indicates, is devoted to the fossil mammalia, described by Mr. Owen, to which work and the admirable illustrations the Wollaston Medal was awarded in February last by the Geological Society. This is prefaced by a Geological introduction by Mr. Darwin, detailing the localities where the remains afterwards noticed were discovered.

All the remains were found between latitudes 31° and 50° on the eastern side of South America; in the provinces bordering the Plata; Bahia Blanca, situated near the confines of Northern Patagonia, and Southern Patagonia. The principal deposit is contained in the almost boundless estuary of the Plata, forming a flat or pampa of reddish argillaceous earth, varying little in elevation and stretching over a surface of some hundred miles in extent, where the traveller may wander "without meeting a single pebble or discovering any change in the nature of the soil." This is intersected by streams, which lay open the immense deposits of animal remains which are there buried, and exhibit to the traveller those wonderful relics which are commenced to be described in the work before us. Mr. Owen, considering the information communicated by Mr. Darwin, is of opinion that this deposit cannot be of very ancient date, and the facts he states seem to bear him out. The change of level which has taken place is by no means considerable, and the numerous accompanying remains of shells belong mostly to recent species, and to many which are at this moment existing in the vicinity. He concludes that a great bay formerly occupied what are now called the Pampas, and the lower parts of Banda Oriental, and that into this the rivers which are now united in the one great stream of the Plata must formerly have carried down the carcasses of the animals inhabiting the surrounding country, and "where the skeletons would thus be entombed in the estuary of mud which was then tranquilly accumulating." The second district where quadrupeds were found is in Bahia Blanca, about 250 miles south of the Plata; it is a large bay nearly surrounded by very low land, on which successive lines of sand dunes mark in many parts the retreat of the waters; and it is supposed, from the bones being found imbedded in their proper relative positions, that the carcasses of the animals when they perished

were probably drifted to this spot in an entire state. One of the skeletons thus placed was encrusted with serpulæ and corallines, which would indicate that it had been for some time before its entombment in the deposit, remaining in the waters which then covered the bay. Among the shells which were found with these remains, twelve species are absolutely identical with existing species; four more are perhaps so, the doubt arising from the imperfect condition of the specimens; and of the remaining seven, four are very minute and one extremely imperfect. The conclusion arrived at regarding this deposit is nearly similar to that relating to the first. The streams, inferior to the Plata, acting together with the currents of a large bay, drifted the remains of the animals towards a point where sand and shingle were accumulating, "the whole area has since been elevated; the estuary and mud of the former ruins have been converted into wide and level plains; and the shoals of the ancient Bahia Blanca now form low headlands on the present coast."

The third locality is in lat. $49^{\circ} 15'$, on the coast of Southern Patagonia, Port St. Julian. The tertiary plains of that country are modelled into a succession of broad and level terraces, which abut one above the other. The whole surface is thickly covered by a bed of gravel composed of various kinds of porphyries. The lower part consists of several varieties of sandstone, and contains many fossil shells, the greater number of which are not found in a living state. The south side of Fort St. Julian is formed by a strip of narrow land nearly a hundred feet in height, and on its surface existing species of littoral shells are abundantly scattered. The gravel is there covered by a thin but irregular bed of sandy or loamy soil, which likewise fills up hollows or channels worn through it. In the longest of these channels the remains of the single fossil quadruped (*Macrauchenia patachonica*) was found imbedded. And Mr. Darwin suggests, that as the Guanaco, the only large animal now inhabiting the plains of Patagonia, often wanders over the extensive flats which are left dry at the head of the harbour during ebb tide, we may imagine that the fossil animal, whilst in like manner crossing the ancient bay, fell into one of the muddy creeks and was there buried. In summing up the whole information collected regarding these deposits, it is considered that there is strong evidence against admitting the theory of a period of overwhelming violence by which these remains were brought to their present state.

The first number, besides the interesting introductory remarks by Mr. Darwin, is nearly entirely occupied with the description of a single gigantic quadruped, of which the cranium was discovered in

the Sarondis, a small stream entering the Rio Negro, about 120 miles N.W. of Monte Video, while an under jaw was procured at Bahia Blanca. In this description there are some very able remarks on the various affinities presented between the remains and the quadrupeds belonging to the Pachydermata, the Rodentia, Edentata and Herbivorous Cetacea, to the first of which it is however more particularly referable. The name of *Torodon platensis* has been applied to this singular animal, the first or generic term relating to the curved form of its teeth, the latter indicating the locality of its discovery. The skull, which is figured of the natural size, on a large folio folding plate, is in length two feet four inches, in breadth one foot four inches. The subordinate dimensions and a description of every part is minutely given, and the following deductions are made. The teeth consist of molars and incisors, separated by a long diastema or toothless space; in the upper jaw the former are fourteen in number, seven on each side; the incisors four, one very large and one small in each maxillary bone; but although the dentary system is decidedly rodent, yet the number of the molar teeth, and their diminution of size as they advance towards the anterior part of the jaw, indicate an approach to the Pachydermata; at the same time it is observed, the *Capybara*, in the increased size of the posterior grinders and other particularities, presents a somewhat similar alliance to the same tribe. The depth of the zygoma bespeaks the size of the masticatory muscles; and the temporal muscles being also large, it is presumed that the great incisors at the extremity of the jaws were used like the canines of the hippopotamus to divide or tear up the roots of aquatic plants. The osseous parts pertaining to the senses of sight and hearing resemble those of the aquatic Rodentia and Pachydermata. The aspect of the nostrils is placed upwards, as in the herbivorous Cetacea; but in the bony structure they materially differ, by having narrow canals of intercommunication between the nasal passages and the frontal sinus. The articulating condyles of the cranium indicate, that when the body of the *Torodon* was submerged, the head could be raised so as to form an angle with the neck, and bring the snout to the surface of the water, without the necessity of any corresponding inflexion of the spine. There is no evidence to determine the character of the extremities, whether they were ungulate or unguiculate, while the structure of the nostrils will suggest that the habits of the animal were not so strictly aquatic, as to warrant the supposition that the under extremities were altogether wanting. Altogether the discovery of these remains is one of the most important which has been made for a long period; and in the

concluding words of Mr. Owen's most valuable observations, "It is highly interesting to find that the continent to which this existing aberrant form of rodent is peculiar (the *Hydrochærus*), should be found to contain the remains of an extinct genus, characterized by a dentition which closely resembles the rodent type, but manifesting it on a gigantic scale, and tending to complete the chain of affinities which links the pachydermatous with the rodent and cetaceous orders."

The description of the remains of another large animal scarcely less interesting is commenced in the concluding pages of the number, but we shall not notice this until we receive its completion. Suffice it to say now, that from the portions of the skeleton which have been discovered containing no parts of the skull or teeth, the animal is considered referable to the order Pachydermata, but with affinities to the Ruminantia, and especially to the Camelidæ. It has been named *Macrauchenia patachonica*.

The number is illustrated by seven well-executed lithographic plates.

A Geographical and Comparative List of the Birds of Europe and North America. By Charles Lucian Bonaparte, Prince of Musignano. London. Van Voorst, 1838. 8vo.

ALTHOUGH only a list of species, this is a valuable contribution to geographical ornithology. Of the nomenclature and arrangement we would not offer a remark, as the author says, "The genera are arranged in these lists in families and tribes, according to the general system of birds on which I have been long engaged, and which I now hope very shortly to bring before the public." When this appears we shall give it due attention. We may state, however, that the system of Boje is much used, at times too far, we think; at the same time, this little publication is of much use, as showing a correct list up to the latest knowledge of species indigenous or partly visiting each country. In another respect it is also important: the ornithology of North America has always been considered as very closely allied to that of Europe, and the identification of species has been perhaps overdone. The Prince of Musignano's catalogue gives those common to both countries: his opinion is gathered from the different name he has given to each, and, from the information which we know this naturalist possesses of the Fauna of Europe and North America, we consider it as bearing great weight; at the same time observing, that so far as our own more limited observations have gone, we are not prepared always to coincide. The letter-press is

printed in double columns, the representing species of each being placed opposite to each other.

The Linnæan orders are retained, while the greater divisions are put into subclasses. Among the Linnæan *Accipitres*, the *Raptores* of the moderns, we find *Aquila Washingtonii* retained as a species. The American osprey is separated from the European under the name of *Pandion Carolinensis*; but among European, North American, and Australian specimens in our possession, we cannot discover characters on which we could found specific distinctions. *Buteo Lagopus* and *vulgaris* are neither placed on the American side; the first is considered, and we think correctly, as the young of *B. Sancti Johannis*, and to the other the name of *B. Swainsonii* has been applied. *F. peregrinus* is represented by the species considered hitherto as such, but now called the *F. anatum*: the habitat given is "the northern parts." *Astur palumbarius* is represented by *F. atricapillus*. *Circus cyaneus* is thought to be distinct from the American bird, which is given as *C. uliginosus*. *Noctua Tengmalmi* of America is made distinct, and is called *N. Richardsonii*, while the Kite or Barn owl of Wilson is named *St. pratincola*.

Among the *Passeres* of Bonap. and Linn., *Insessores* of moderns, we find the following species, which have been considered identical, now separated: *Certhia familiaris*, represented in America by *C. Americana*; *Pica caudata* by *P. Hudsonica*; *Corvus Corone* by *C. Americanus*; and the *C. Corax* by *C. Catototi*; and *Corvus Columbianus* is placed under the genus *Nucifraga*. *Ectopistes migratoria* is omitted in the European side, but we believe it has been twice killed in Scotland, and would rank as an accidental straggler with as much propriety as the *Erythrophrys Americana*. Among the remaining orders there is less change, the species most closely allied showing at once some specific distinction easily seized, at the same time the comparative list is most interesting to look over, and still more so if the two representing species can be at the same time compared. Among the ducks, *Clangula vulgaris* is placed opposite to *C. Americana*, the *A. clangula* of Wilson. Several of the above-named birds we have examined, and at the time we thought very minutely, and considered identical: a comparison of many specimens from each country might induce a change of opinion; and we have now to regret that the distinctions between all those so closely allied had not been shortly given, by which we should have been at once enabled to judge of the propriety or impropriety of the Prince's separations.

Malacologia Monensis: a Catalogue of the Mollusca inhabiting the Isle of Man and the neighbouring Sea. By Edward Forbes, For. Sec. B.S. &c. Edin. 1838. Duod. pp. 63, with three plates.

WE are partial to books of this description, which, although requiring no high attainments on the part of their authors, and productive of little fame and no money, are essential towards the completion of a British Fauna, and are very acceptable to that class of men who find their "hobby" in the quiet pursuit of collecting objects of natural history,—men whose pleasure it is to discover *species* hitherto unknown, and who accustom themselves to see

" Form in things which to the eye
Half-read is but deformity ;—
Grandeur in mean things and small,
And God's great handiwork in all ! "

To such this will be an acceptable volume, containing as it does a copious list of species found in a little island, of the conchology of which little is to be learned in works of more pretension and greater extent. A few more notices illustrative of *habit* in the creatures, and an occasional note relative to anything remarkable in the *habitat*, would have been agreeable, and would have served to keep the reader lingering a little over pages which are essentially a catalogue, and exhibit scarcely more than a list of species. We would strongly impress on the attention of local Faunists the extrinsic aids and ornaments by which they might render their "opuscula subseciva" somewhat more extensively interesting and attractive.

As we glance over the pages, we remark that *Doris Flemingii*, as *D. nigricans* of Fleming is here called, is no other than *D. pilosa*, confirming a conjecture offered at p. 55 of the 'Annals.' The *Melibeia fragilis* of Mr. Forbes, rather ambiguously characterized, is *M. coronata* of the 'Annals,' p. 117. *EUBRANCHUS*, a new genus among the Nudibranchia, is thus defined :

Corporis ovato, convexiusculo; tentaculis quatuor; oculis nullis; dorso branchiis ovatis instructo:

and the only species, *E. tricolor*,

Corporis albo-carneo; branchiis pyriformo-ovatis tricoloribus. Long. 4 un. Lat. 4.

The genus is referred, erroneously in our opinion, to the family *Glanicus*: it rather belongs to an aberrant group, not yet defined, and to which *Triops* likewise appertains. In many ensuing pages there is nothing to detain us until we reach the "*Natidae*," which Mr. F. has attentively studied; and his remarks on the species will interest

the conchologist. Under *Lima* and *Arca* there are remarks equally attractive; and lastly, we find the author of opinion that the *Unio Roissyi* is merely one of the variations of *U. margaritifera*.

This brochure is a specimen of a more extensive work which we hope the author will prosecute and complete: we must bargain, however, for better plates.

Archiv für Naturgeschichte. In Verbindung mit mehreren Gelehrten, herausgegeben von Dr. Ar. Fr. Aug. Wiegmann, Professor an der Friederich Wilhelms-Universität zu Berlin. Viertes Jahrgang. Erstes Heft. Berlin, 1838.

As this is the first occasion of mentioning this journal in our pages, we shall take the opportunity, before noticing the contents of the present part, to inform our readers of the general tenor of this work. Its plan resembles our own except in one point, namely, in the annual Reports on the progress of the various branches of natural science which it contains, and which are of the greatest value to all naturalists. The zoologist finds notices of all the works which have appeared in any country on zoology, with short criticisms; also every new species, and generally with the characters, giving him much of the information which is most essential. The lover of vegetable physiology will find in the valuable reports of Prof. Meyen the various labours of physiologists, and the conclusions to which they have come, criticized and compared with each other; so that without the necessity of consulting works, many of which are extremely expensive, he may be sufficiently informed with regard to the objects of his pursuit to know generally what has been done, and not to imagine he is making discoveries merely because he is unacquainted with what others have accomplished; whilst in regard to those subjects on which further information may be desired, the sources from whence it may be obtained are carefully indicated. We cannot too much recommend these reports to our countrymen, as the labours of foreign naturalists are from various causes too tardily and imperfectly known here; and as they are the productions of persons well known to the scientific world as being well qualified for the task of preparing them. The zoological report is drawn up by Prof. Wiegmann; that on helminthology by Dr. v. Siebold; on entomology by Dr. Erichson; on palæontology (*Petrefactenkunde*) by Dr. Quenstedt; on vegetable physiology by Prof. Meyen; on phytochemistry by M. Marquart of Bonn. Of these, Meyen's report for the year 1836 has been translated in part, and Marquart's on phytochemistry for 1835 entirely, and are to be found in the Philosophical Magazine. On account of

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their great length we must regret that we are unable to introduce them into the Annals, and can only refer our readers to them as most valuable sources of information. Among the contributors to the Archiv will be found the names of Link, Kunth, Dr. Schleiden, Dr. Philippi, Prof. Muller, Ehrenberg, Anton, Nitzsch, Wagner, Klug, Burmeister, Dr. Fritsche of St. Petersburg, Schlegel, Nathusius, and various other celebrated naturalists of Germany. Six parts appear yearly, and as nearly as possible every two months; sometimes, however, two parts appear together. Part I. of the fourth year (1838) contains the following original articles:—On the Manati of Orinoko from the manuscript of A. v. Humboldt, with an appendix by Prof. Wiegmann.—On the European *Soricida*, by H. Nathusius.—Use of the Nuthatch (*Sitta Europæa*) in destroying weevils.—Botanical Notices, by Dr. Schleiden.—On two new genera of Coleoptera from Madagascar, by Prof. Klug.—On the genera of the Plagiostomi, by Müller and Henle; with translations of Agassiz's Memoir on the family of the Carps, and J. E. Gray's on the *Macrtrada*. We hope to be able to give some extracts from the above in our next number.

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

October 10th, 1837, R. Owen, Esq., in the Chair.—A paper was read by Colonel Sykes "On the identity of the "Wild Ass of Cutch and the Indus, with the Dzeggetai (*Equus Hemionus* of Pallas)."

The author commences with observing, "it is somewhat strange and anomalous, that an animal known to and named by Aristotle, and noticed by Ælian, Pliny, and subsequent authors, down to our own day, an animal remarkable for its beauty of colour, the antelope lightness of its limbs, and the tales of its swiftness, and its classic locality, should have attracted so little the attention of men of science, that it was not even figured until Pallas put it before the public*. The magnificent work of Buffon does not boast a representation of it; and as the proceedings of the scientific body at Petersburg are necessarily rare, and confined to some few great public libraries, it was in fact scarcely known to the European world, even though Pennant copied Pallas's account in 1793. To remedy this defect we are indebted to M. Isidore Geoffroy Saint Hilaire, who took advantage of the importation by M. Dussumier, of a female into the Paris Menagerie, to have a correct coloured figure made to accompany his paper, 'Sur le Genre Cheval,' in the Nouvelles An-

* In the *Novi Commentarii Academiæ Scientiarum Petropolitanae*, t. xix. 1774, p. 417.

nales du Muséum d'Histoire Naturelle*. Though I have been an amateur of Natural History for a great part of my life, I must confess that it is to a private copy of M. St. Hilaire's paper, obligingly presented to the Zoological Society of London, that I am indebted for my first view of a coloured representation of the Dzeggetai, and it was only last week that this fell into my hands. I have been thus particular in noticing the want of readily accessible figures of animals (for my observation will apply to many other animals beside the Dzeggetai,) as this want of means to correct my judgement led me into the belief that a recently imported Wild Ass of Cutch, which was sent to England by an old friend of my own from Bombay, was a different species from the Dzeggetai of Pallas, which is represented as inhabiting the desert regions between the rivers Onon and Argun, on the southern parts of Siberia, through Tartary, even to the frontiers of China and Thibet; and I might have been justified in my supposition had I attached the same weight that some naturalists do, to the opinion that the geographical distribution of animals is regulated by mean temperature, the Dzeggetai of Pallas inhabiting the borders of the arctic regions, the Wild Ass of India the borders of the torrid zone. There might be yet further question for doubt, did we take the description of colour from Griffith's edition of the 'Règne Animal,' in which it is stated 'there is a *black* dorsal line which enlarges on the crupper. In winter the hair is very long; but of a smooth and shining appearance in summer. The colour of the body is an *uniform* light bay, but in winter it partakes more of red †; and the forehead is described as 'flatted and narrow.'

"M. St. Hilaire, who describes from the life, says 'Les deux couleurs dominantes de l'*Hemione*, le blanc et l'isabelle passent l'une à l'autre par nuances insensibles sur le ventre, vers sa partie inférieure, et sur le cou, presque à égal distance de son bord supérieur, et de son bord inférieur. Sur la tête au contraire, le blanc n'occupe guère que le museau et la gorge, le cou étant presque entièrement isabelle. Sur les membres, contrairement à ce qui a lieu sur le corps, c'est le blanc qui domine,' &c. Again, 'Tout ce système de coloration est rebassé supérieurement par une *bande* dorsale longitudinale, *non pas noire* comme on l'a dit, mais d'un brun légèrement rous-sâtre.' And now with respect to the *change* of colour with the season of the year, instead of getting redder in winter it would appear from the observations of M. Fred. Cuvier, that the 'animal a le poil plus gris, plus pale et plus long l'hiver que l'été.' These discrepancies

* t. iv. p. 97.

† Quarto edit., vol. iii. p. 100.

would have afforded to those strongly disposed to multiply species, some feeble grounds (particularly when I come to notice a point of conformation in the head,) for asserting the right of the Wild Ass of Cutch to the dignity of a specific character, for it will be borne in mind that M. St. Hilaire describes his specimen, which was a native of Cutch; while in Griffith's Cuvier the description refers to the Dzeggetai, whose habitat is from southern Siberia to Thibet and China; and we do not want instances of equally trifling discrepancies having been made available for multiplying species.

“ And now with respect to the animals in the Zoological Gardens, the one being called Dzeggetai, and marked on its ticket Mongolia and Asia; the other known positively as the Wild Ass from Cutch. The first, a male, has been in the possession of the Society since the 3rd of March 1832, and was presented to the Society by Captain Glasspoole, R.N. Its birth-place is not known; but from the nature of Captain Glasspoole's maritime duties, which carried his ship along the coasts Cutch, Scind, and Persia, there is little doubt of its being from one of these states; and as it is absolutely identical with the animal I am about to speak of, my own judgement is formed on the subject. . This creature has long been known in the gardens from its great beauty, its fine condition, its vivacity, and its wickedness. The second animal was sent while quite a colt by an old friend of mine, the British Minister in Cutch, to the Military Auditor General of Bombay. It was allowed for a considerable period, (pending an answer from me, whether or not I would accept of it,) to amuse the children; it was permitted to attend at breakfast-time, and eat from the table; but manifesting as it grew up symptoms of ill nature, (no doubt having been heartily teased,) it was put on board the Marquess of Hastings, Captain Clarkson, and brought to England: there cannot therefore be any doubt respecting its origin and its history; and having one animal certainly from Cutch, we have a positive standard of comparison. Like the preceding, it is a male, and with the exception of being younger and smaller, and with a less short and glossy coat, it is identical with it in every feature; and these two agree in all essentials with M. St. Hilaire's very able and minute description and coloured figure of a female in the Paris Menagerie. There is one point only in which there may be a difference, and there are two or three others in which there is a difference. . M. St. Hilaire does not state whether the forehead be flat or prominent; and though the figure represents it to be somewhat raised, it is certainly not so much so as in the animals in the Zoological Gardens: with them the frontal development is a very prominent feature; such fea-

ture, however, being opposed to the descriptions in Griffith's '*Règne Animal*.' M. St. Hilaire also mentions another character, which it required some little perseverance to discover in the larger animal in the Zoological Gardens, the smaller animal being absolutely destitute of it. He states that on the isabella colour on the limbs, there are transverse lines or very narrow bands of a darker isabella, in the manner of the markings of the Zebra. These lines had never been observed by the keepers in the Zoological Gardens, and for some time I could not discover them; but at last with a reflected light I could just discern the transverse lines noticed by M. St. Hilaire, but I was not so fortunate with the smaller animal. M. St. Hilaire, on the authority of M. Geoffroy-Chateau, who sent to him a description of a male Dzeggetai in Cross's Menagerie in London, states that there was a disposition in the dorsal band on that animal, by lateral projections at the withers, to form a small cross, like that of an ass. There is not the slightest trace or manifestation of such a thing in either of the animals in the Zoological Gardens. Finally, M. St. Hilaire speaks of the blending by insensible degrees of the isabella and white markings of the Dzeggetai, but in our animals the lines of demarcation are sufficiently strong.

"M. St. Hilaire's humorous description of the habits of kicking of the female at Paris, is laughably exact with respect to our animals, particularly the smaller one. I had sent one of the keepers into its yard with some hay, to throw down before it, to keep it stationary (at least its body) while I took a rapid sketch of it with the assistance of the camera lucida. The moment the hay was thrown down, the creature turned round and commenced flinging out most vigorously for some time, although the man was gone, and the odd beast all the time was gravely munching its hay. So petulant were both these creatures, that after having sketched them I could not get any of the keepers to take their measurements, nor could I succeed in obtaining them, but by getting them thrown down, which I declined to do. With respect to the swiftness of the Wild Ass of Cutch, without quoting from Griffith 'that it runs literally with the rapidity of lightning,' or from M. St. Hilaire, who says, 'it appeared to him to go as fast as the best race horses;' I will mention in confirmation of its extraordinary swiftness, that my friend Major Wilkins, of the Cavalry of the Bombay Army, who was stationed with his regiment for years at Deesa, on the borders of the Run or Salt Marshes, east of Cutch, in his morning rides used to start a particular Wild Ass so frequently that it became familiar to him, and he always gave chase to it; and though he piqued himself upon being mounted on an exceedingly fleet Arabian horse, he never could come up with the animal.

“ It now remains to express my reasons for believing with M. St. Hilaire, that the Wild Ass of Cutch is the same as the *Equus Hemionus* of Pallas. There are certainly sundry discrepancies in the accounts of the two animals; in the colour, the dorsal line, the forehead, and above all in the difference of mean temperatures between the northern and southern habitat of the species. But all the discrepancies of descriptions may be easily remedied by the supposition that animals examined by different individuals at different seasons of the year, did really slightly differ, owing to the difference of seasons; and some part of the differences may be attributed to inattention to terms. There are slight discrepancies between M. St. Hilaire's description and mine, both taken from life, and the animals from the same locality; no one therefore can doubt their identity. In the main features the Dzeggetai and the Wild Ass of Cutch perfectly agree; and with respect to the extent of geographical distributions, I have elsewhere proved that it is no bar to the identity of species inhabiting mean temperatures varying nearly 40° of Fahr., and separated by half the earth in longitude. But in the case of the Dzeggetai and the Wild Ass of Cutch, there are not any insuperable difficulties of geographical position. The Wild Ass of Cutch and the north of Goojrat, is not found further south in India than Deesa on the banks of the Bunnas river, in lat. about $23^{\circ} 30'$, nor have I heard of it to the eastward of the 75° of longitude in the southern side of the Himalayan Mountains. In Cutch and Northern Goojrat it frequents the salt deserts and the open plains of Thoodpoor, Jaysulmer, and Bickaneor. By swimming the Indus it may communicate through Scind and Buloochestand with Persia; and in Persia it evidently exists from Sir Robert Kerr Porter's descriptions; to the east and north of Persia abuts upon the peculiar localities of the Dzeggetai, through Bucharria to the deserts of Cobi, where it delights in the salt marshes, as it does in India, and thence to Tartary, Thibet, and South Siberia. The latitudinal range may be from 35° to 40° ; but the longitudinal range is necessarily very great, probably from the 45° to the 130° or 140° , or 95° of longitude; but in case it ever was found in Cappadocia it would have a still greater range, or 100° . If it be desirable to believe that the animal migrates according to the season, there do not appear to be any insuperable physical impediments; and its extraordinary fleetness and hardihood would sanction the belief in its making very long journeys, even to the banks of the Indus. But the animal of Cutch and the Burmah river, would have to cross the Indus and its branches to get to the north and west; and as they are seen at all seasons of the year in their Indian localities, I am quite content to

believe that the Dzeggetai of Southern Siberia and the Wild Ass of Cutch are identical in species, and yet do not wander further than is necessary for forage from their respective localities. I say little of the advantage of domesticating this beautiful animal in Europe, but I do say that it would be worthy of the reputation of the great Society, to continue the attempt until success crowned its efforts.

"I wish also through the medium of the Society's Proceedings to call the attention of naturalists, amateurs, and travellers, who cannot even draw at all, to the means the camera lucida affords them of recording outlines with celerity and precision. I exhibit to the Society five sketches of the two Wild Asses in the Zoological Gardens; and though I do not profess not to be able to draw, I do not hesitate to say that I can give much more correct figures of animals by its means than without it. It may be objected that the restlessness of animals renders the use of the camera lucida abortive; but I say that the rapidity with which the lines may be traced with the pencil, enable a person using it to make twenty sketches, where the draughtsman would otherwise make but one, and it will be hard if more than one of the twenty do not prove just. The five sketches exhibited were made in a few minutes; and only one proved abortive, making six attempts in all; and yet I have not used the camera lucida since 1830. The outlines have been subsequently traced in ink. I trust therefore this notice may lead to its more extended use; a use in natural history that cannot fail to be beneficial to the science. One word in conclusion. I have been a declaimer in the Transactions of this Society against the modern habit in natural history of generalization from a limited number of facts; and in pursuing the above inquiries I met with a new proof of the risk to truth of such a system. In the history of the Domestic Ass it is stated, 'The countries most suitable to the Ass are those of the south. Accordingly it is in Persia, Egypt, and Arabia that the strongest and finest varieties of this species are to be found. Some, very different from the small and feeble natives of our climates, almost equal the Horse in magnitude and stature. Spain also possesses some fine races of the Ass, which are also occasionally to be found in the southern provinces of France; as we advance northward, the animal diminishes in size and becomes more and more difficult of preservation.' Opposed to this is the fact, that in Western India, which it will be admitted is sufficiently far to the south, the Asses are not much larger than good-sized Newfoundland dogs. They are used in droves to carry small loads of salt or grain; they are also used by the pot-makers to carry their clay; and they are always seen, as in Europe, associated with gipsies."

LINNEAN SOCIETY.

May 1.—Edw. Foster, Esq., V.P., in the Chair.

Mr. Curtis read a paper, being descriptions of the *Coleoptera* collected by Capt. P. P. King, R.N., during his survey of the Straits of Magellan.

No region of the world presents more curious forms or more splendid colouring amongst insects than South America. As we proceed to the more temperate regions of the south, however, they partake considerably of the sober colours of our European species.

This interesting collection contains a very considerable number of new species, and of these Mr. Curtis has formed the following genera.

Fam. CARABIDÆ. Gen. 1. CASCELLIUS.

Head rather small and ovate. Thorax elongate, obovate-truncate. Elytra large, convex and oval, base narrowed, apex rounded. Anterior tibiæ deeply notched, denticulated externally: anterior tarsi with the 3 first joints dilated and obtrigonal in the male, intermediate slightly dilated, especially the basal joints. Antennæ with the 2nd joint short, 1st and 3rd of equal length. External maxillary palpi with the 2nd joint the longest, 3rd short, 4th stout and fusiform: labial with the 3rd joint long and fusiform, stouter than the 2nd, mentum trilobed, central lobe trigonal-truncate.

The examples are *C. Kingii* and *C. Gravesii*.

2. CARDIOPHTHALMUS.

Head rather narrow and ovate; eyes cordiform. Thorax convex, cordate-truncate. Elytra connate, broad and ovate, base narrowed, apex rounded. Anterior thighs tuberculated beneath, anterior tibiæ notched, with 2 long stout spines, anterior tarsi with the basal joint elongated and a little dilated in the male, 3 following small obtrigonal. Antennæ with the basal joint stout, 2nd the shortest, 3rd longer than the following. Palpi with the terminal joints elliptic-truncate, the 2 apical of equal length. Mentum not largely emarginate, with a broad deeply notched tooth in the centre.

Example. *C. Clivinoidea*.

3. ODONTOSCELIS.

Head broad and ovate; eyes small, remote from the base. Thorax sublunate: scutellum broad and triangular: elytra elongate-ovate, the base narrowed, apex rounded. Tibiæ, anterior notched, the apex produced into a long lobe externally: tarsi, anterior dilated in the male, and spiny. Antennæ not longer than the head, basal joint the stoutest, 2nd subglobose, 3rd clavate, a little longer than the following, which are turbinate: palpi external maxillary with the 3rd and 4th joints short, the latter elliptic-truncate and the stoutest; 2 ter-

minal joints of the labial longer and slenderer. Mentum with 2 large lateral lobes and a strong conical one in the centre.

Example. *O. Tentyrioides*.

4. CYLLOSCELIS.

Head broad, eyes small. Thorax subquadrate-cordate. Elytra sublinear. Tibiæ, anterior dilated, with a shallow notch, the apical spine broad and lanceolate, hinder longer, slender and curved : tarsi anterior with the 4 basal joints cordate. Antennæ not longer than the head, basal joint the longest and stoutest, 3rd pyriform, 2nd, 4th and following subovate. External maxillary palpi with the 3rd joint nearly as long as the 2nd, 4th elongate and nearly linear : labial with the 3rd joint long, subfusiform-truncate : mentum with a strong trigonate tooth in the middle.

Example. *C. ellipticus*.

5. METIUS.

Head suborbicular : eyes prominent. Thorax subquadrate-cordate : scutellum dividing the elytra which are elliptical, the apex slightly emarginate. Anterior tibiae not deeply notched : anterior tarsi with the 3 basal joints dilated and obovate-truncate in the males. Antennæ slender, as long as the head and thorax, basal joint the stoutest, 2nd not short, 3rd and following long. Labrum rather deeply notched : mandibles short and strong ; terminal joint of palpi shorter than the penultimate, elliptic-truncate ; mentum broadly emarginate and simple.

Example. *M. harpaloides*.

The species noticed amount to 54, and were collected between 20° and 56° south latitude.

Read a paper on the affinities of *Arachis* and *Voandzeia*. By George Bentham, Esq., F.L.S.

The genus *Arachis* has been placed along with *Voandzeia* by De Candolle among the *Cesalpinææ* in his tribe *Geoffrææ*, which is characterized by having a papilionaceous corolla, combined stamina, and a straight embryo ; but at the same time well aware of the affinity subsisting between those two genera and the arborescent *Geoffrææ*, he suggests the probability of their forming a separate tribe. Mr. Bentham has however, in the paper before us, clearly shown that the real affinity of *Arachis* is with *Stylosanthes*, and consequently that its proper place is among the *Hedysarææ*, from which it differs chiefly in the legume not separating into distinct articulations, a circumstance to be attributed to its position underground. Mr. Bentham follows Ernest Meyer in referring *Voandzeia* to the *Phaseoleæ*.

The perfect flowers of *Arachis*, accurately described by De Candolle as to the calyx, corolla, stamina, ovary, and style, are accord-

ing to Mr. Bentham constantly sterile, and although they are furnished with an apparently perfect ovarium containing two or three ovula, he has observed it to fall off with the calyx, and that the legumes are produced both in *hypogæa* and the other species by the female flowers, whose structure is very different, being destitute of either calyx, corolla, or stamina; but from between two small bractes, resembling those occurring at the base of the sterile flowers, proceeds a straight rigid stipes or torus, which speedily becomes reflexed and elongated, and is terminated by what appears to the naked eye a sharp point, which, when examined with a glass, discloses at its extremity a truncated, somewhat concave and dilated stigma, and within it is found a cell bearing two or three anatropous ovula placed transversely one above the other. After fecundation, when the extremity has nearly reached the ground, it begins to swell, but remains continuous with the stipes or torus, without any articulation even at the maturity, when the legume is usually broken off with more or less of laceration.

We subjoin the characters of the species given by Mr. Bentham.

1. *A. hypogæa*, annua; caule erecto vel adscendente ramoso piloso, foliis obovatis obtusis mucronatis, supra glabris, subtus pilosulis.
2. *A. glabrata*, perennis, glabra, vel hinc inde pilosula, adscendens; stipularum parte libera elongata ad foliorum par infimum subattingente, foliolis oblongo-ellipticis obtusis mucronatis basi rotundatis brevissime petiolulatis, supra glabris, subtus vix pilosulis. Brasilia.
3. *A. pusilla*, perennis; caule procumbente pilosulo, stipularum parte libera brevissima, foliolis ovatis oblongisve acutiusculis mucronatis basi rotundatis, supra glabris, subtus adpresse pubescentibus subsericeis. Brasilia.
4. *A. prostrata*, perennis; caule prostrato villoso, stipularum parte libera elongata at foliolorum par infimum non attingente, foliolis ovatis oblongisve obtusis mucronatis basi rotundatis, supra glabris, subtus adpresse villosis. Brasilia.
5. *A. villosa*, perennis, caule prostrato villoso, stipulis foliolorum par infimum superantibus, foliolis lato-ovatis rigidis mucronatis, supra pubescentibus, subtus pilosis. Brasilia.
6. *A. tuberosa*, perennis, caule brevi subsimplici, villoso, petiolis abbreviatis, foliolis obovatis oblongisve obtusis muticis basi angustatis rigidis marginatis reticulatis glabris subciliatis. Brasilia.

ROYAL SOCIETY OF EDINBURGH.

18th Dec. 1837.—Dr. Hope, V. P. in the Chair.

Read, Professor Traill's remarks on the Ossiferous Caves of Geln, in Denbighshire.

These caves, which were first described by the present Bishop of Norwich in 1832, and have since been more fully explored by Dr.

Cumming of Denbigh, were visited by the author in the autumn of 1837. The principal cave is a fissure in a grand mural escarpment of the mountain limestone of Wales, about two miles and a half south-west of St. Asaph, and occurs half way down the precipice, which seems to be about 250 feet in height. It forms at that point the southern boundary of the limestone, which constitutes the basis of the Vale of Clwyd; and is divided from the extensive greywacke slate formation of that county by the narrow picturesque vale of Cyffredin, through which the river Elwy flows.

The hill of Cefn consists of parallel beds of limestone, which the extensive quarries on its southern flank show to have a regular dip of about 8° . This cave was discovered in 1830 to contain earthy deposits exceedingly rich in bones of mammifera: and, since that period, they have been much employed as a manure by Mr. Lloyd, the proprietor. During the excavations for this purpose, many teeth and fragments of larger bones, so entire as to be readily recognised, have been obtained. An interesting collection of them is preserved at Cefn House, and some are in the hands of the author. Among the former, he noticed part of the humerus and a molar tooth of a rhinoceros, several teeth and bones of the hyæna, and beautiful teeth, and a considerable portion of the lower jaw, of a bear. Dr. Traill has in his possession two phalanges and two teeth of a bear; a phalanx of a large *Felis*, resembling the tiger; parts of the tibia, and of the astragalus, and a phalanx of a large *Bos*; portions of the metacarpus of an immense ruminant, apparently a deer; besides a variety of fragments, not so easily ascertained on account of their mutilated state.

The materials which filled up the fissure or principal cave almost to its roof, are regularly stratified. They formed together a mass of earthy matter twelve feet in thickness. The first or upper bed consists of layers of clay and very fine sand, two feet thick. The second bed is of plastic clay-marl, containing many small water-worn pebbles, chiefly of clay-slate, two feet thick. The third is a stratum so filled with broken and comminuted bones, as apparently to consist entirely of that material, two feet thick. It is in this bed that all the bones mentioned, except those of the bears, are found. Immediately below is the fourth bed, consisting of plastic marl-clay, with many water-worn pebbles of slate and compact felspar, with angular pieces of limestone; this is also two feet thick. The fifth bed consists of fine sand, which seldom contains any pebbles. It rests on the floor of the cavern, and has usually a depth of four feet. In one part of the cave, however, Dr. Cumming detected below this bed a floor of hard stalagmite, about sixteen feet square; and on breaking it up, bones

of bears were found mingled with sand and large water-worn pebbles of the rocks already mentioned.

One of the most interesting observations which occurred to the author during his investigation was, that the stratified earthy materials filling the cave were *not deposited horizontally, but had an evident dip*, which he remarked was in the same direction and apparent inclination as that of the limestone rock itself. The important inference he drew from this is, that the stratified materials were deposited in the cave before the limestone received its present position; and he conjectured, that the animals whose remains are here preserved may have existed even before the last great disturbances of our carboniferous system of rocks. Should similar phenomena be observed in other caves, it would perhaps carry back the existence of mammiferous animals to geological epochs more ancient than generally supposed; and account for the occurrence of diluvial materials in similar situations, without the startling supposition of extensive degradations of solid rocks, by causes apparently inadequate to produce them. Another cave exists in the same neighbourhood, in which bones have also been found. It is near the village of Pont Newydd. In its bottom was found a collection of hyæna bones, in a mass of calc-sinter and gravel, four feet in thickness.

The author illustrated his paper by a view of the cliffs of Cefn, and by a plan and sections of the principal cave.

PROCEEDINGS OF THE ROYAL ACADEMY OF BERLIN.*

Feb. 23, 1837.—M. von Buch read a paper on the Jura in Germany.

The German Jura in Swabia and Franconia is an uninterrupted continuation of the Swiss Jura. Its external form is that of a glacis of a fortification, with a gentle descent towards the exterior, and a steep fall towards the interior. Opposite to it stands the similar range of the French Jura, on the right side of the Saône upwards, and on the left sides of the Meurthe and Moselle downwards. The steep declivities of these elevated ranges are turned towards each other, and the space, which they for the most part surround, is in the northern parts almost completely inclosed by older grauwacke mountains. The interior of this immense basin contains the greatest portion of Burgundy and Lorraine, the whole of Alsace, Swabia, Franconia, and Hessa, and includes no mountains of the Jura formation. For this reason M. von Buch considers the chains to have been originally produced in their present form, with their canal-like valleys,

* Translated from the Bericht über die Verhandlungen der königl. Akademie der Wissenschaften zu Berlin.

which traverse four or five times the whole breadth of the chain, and with their deep inlets and sections. This being exactly the form and structure of the great coral reef which surrounds New Holland, we may be inclined to ascribe to both a similar mode of origin. The chalk formation draws itself close up from the exterior so as to surround the Jura ranges, but in the interior of the encompassed country there is not a trace of it to be found. From this we have evidence of the mural elevation of the Jura existing previous to the deposition of the chalk.

The Jura range is divided by nature into three parts : 1. The Swiss Jura, in which the layers are always much inclined, and form long extended ridges and chains ; 2. The Swabian Jura, in which the layers lie regularly and horizontally upon one another, and form a large plateau little undulated and extending over many miles ; 3. The Franconian Jura, in which the middle is occupied by extended masses of dolomite, which appear on the heights like obelisks, towers, or ruins of gothic castles. This appearance of dolomite begins almost exactly where the Jura changes its north-easterly for a northern direction. The dolomite is no new superadded mass ; one series of strata would be deficient, were we to consider it a Jurassic stratum which had hitherto not occurred. Besides, it possesses no peculiar zoological character, and for this reason gives indications of its origin from the metamorphosis of limestone.

In height or section the Jura ranges may also be divided into three parts : 1, a black one, the layers of lias and shales ; 2, a brown, the coarse brown sandstone ; 3, a white one ; fine-grained layers of limestone, coral, and shell banks. A description and catalogue of the characteristic fossils of each layer of these divisions gives a more clear and accurate idea of them and of their zoological character, than the long, and frequently inaccurate descriptions often given, in which the same thing is frequently repeated under different names.

The lias, which makes its appearance almost everywhere at the foot of the mountains, contains almost nothing, but such organic products as are peculiar to it alone, and these products in general are the same in all countries hitherto examined.

The middle part of the Jura is more varying. That which appears in the southern parts of England and in France in the form of oolite, is in Germany a coarse sandstone, with analogous shells in it ; but in the north of England this sandstone contains a quantity of impressions of plants, and even coal, which are quite similar to those which we on the other hand find in the keuper, recollecting that in other organic products both formations have nothing in common with each other.

In the upper or coralline part of the Jura, the limestone containing *Diceras* and *Nerinea* has been followed, especially in 1836, as the exterior covering and last layer of the Jura formation, over the whole northern inclination of the Swabian Jura. This peculiar formation (Portland stone) is wanting in the Franconian Jura. It commences first below Hemmau, probably above the lithographic slates, forms the vale declivities of the Nab and of the Laber near Regensburg, the rocks of Abach and Kellheim near Altmühl, the hills of Neuburg and Ingolstadt, and raises itself near Ulm to the greatest heights of the range at Nattheim and Heidenheim. It continues over Möskirch, and probably joins immediately with those layers near Solothurn which have been so accurately examined by M. Hugi. *Diceras* and *Nerinea* at Ingolstadt, as also the large *Pinna* (*Trichites*) *granulata*, (*Mytilus amplus*.) which first occurs in abundance near Pillmansdorf, between Hemmau and the Laber, give to these layers a prominent character. Besides, a quantity of other shells occurring in it, as *Pholadomya donacina*, *Pterocera Oceani*, *Terebratula triloba*, *Isocardia ex-centrica*, &c., may be regarded as fossils characteristic of it. It is not quite clear whether the lithographic slate really dips under the *Diceras* limestone; perhaps they only occur together, without continuing one beneath the other; for the lithographic slates are proved by their *Pterodactylus*, *Libellula*, *Algæ* and *Fish*, to be a littoral formation; but the limestone with *Diceras* and *Nerinea*, on the other hand, appear, by their gigantic shells, to be a pelagian formation.

MISCELLANEOUS.

FUNGI OF INDIA.

IN General Hardwicke's Drawings, now in the collection of the British Museum, there is a book containing figures of a considerable number of Indian *Fungi*. It is curious to observe, that with only one or two exceptions, such as the genus *Podaxon* of Fries, they all very much resemble the European species, and belong to European forms.—J. E. GRAY.

TRACHYPTERUS VOGMANUS.

PROF. REINWARDT, of Copenhagen, has recently published in the Transactions of the Danish Academy a detailed account of this curious and very rare fish, which has hitherto been so imperfectly known.

OTIS TARDA.

SHOT a few days since near Dereham, a fine specimen of that rare and nearly extinct bird, the Great Bustard, *Otis tarda* of Linnæus. It was a female bird, in excellent plumage, and is now in the possession of Mr. J. Knight, the bird preserver, of London Street, Norwich.

ZOOLOGY OF JAVA.

TEMMINCK, in the Fauna Japonica, states, that he knows 82 kinds of mammalia, 455 birds, and 90 species of amphibia, as inhabiting that island, although the interior is almost entirely unknown.

ON THE TWO SPECIES OF ECHIDNA, BY J. E. GRAY.

SIR E. HOME, in his paper in the Phil. Trans. for 1802, figured two specimens of this animal, and Cuvier (Règne Animal, vol. i. p. 225,) considered them as two species, naming the one *Echidna Hystrix*, and the other *E. setosa*; but most succeeding zoologists have regarded them as a single species, some considering the latter as either the winter state, others as the young of the former. The specimens which we have in the British Museum show that they are very distinct species, coming from different countries, and differing more in the colour of the fur than in the length of the spines. The *E. Hystrix*, Cuv. (*Myrmecophaga aculeata*, Shaw, *Misc. Nat.* t. 109, O. *Hystrix*, Home, *tab.* at p. 340,) is black, and came from the continent of New Holland, while *E. setosa*, Cuv. (Home, *tab.* at p. 341?), is brown, with a blackish spot on the orbit: this is confined to Van Diemen's Land. They both grow to the same size: the full grown are nearly eighteen inches long.

METEOROLOGICAL OBSERVATIONS FOR APRIL 1838.

Chiswick.—April 1. Cold and dry: frosty. 2. Sharp frost: cold and dry. 3—5. Fine. 6. Cloudy. 7. Rain. 8. Cloudy. 9—14. Very fine. 15. Fine: clear and windy. 16. Hail showers in forenoon: snow. 17. Cloudy and cold: showery at night. 18. Cold and dry. 19. Slight snow: overcast and cold. 20. Sleet and hail. 21. Fine. 22. Rain: fine. 23. Very fine: rain at night. 24, 25. Fine. 26, 27. Bleak and cold. 28, 29. Cold and dry. 30. Slight rain. The mean temperature of this month was four degrees below its usual average at this place.

Boston.—April 1. Snow. 2—4. Fine. 5. Fine: rain P.M. 6, 7. Cloudy: rain early A.M.; rain P.M. 8. Stormy: rain early A.M.; rain P.M. 9. Cloudy. 10. Rain. 11. Cloudy: 3½ P.M. thermometer 65°. 12. Fine. 13. Cloudy. 14. Fine: rain P.M. 15. Cloudy: stormy P.M. 16. Stormy: snow P.M. 17. Stormy: snow early A.M. 18. Stormy: snow P.M. 19, 20. Cloudy: snow early A.M. 21. Cloudy: large quantity of hail A.M.: rain P.M. 22. Cloudy. 23. Fine: rain P.M. 24. Fine. 25. Cloudy: rain P.M. 26. Stormy. 27. Rain. 28, 29. Fine. 30. Rain: snow early A.M.: rain P.M.

Applegarth Manse, Dumfriesshire.—April 1. Clear and frosty. 2. Shower of snow: melted. 3. Moist: showery: cold. 4. Showery but mild. 5. Wet: cleared up: fine day. 6. Wet: blowy: cleared up. 7. Wet all day. 8. Dry: hills covered with snow. 9. Dry: cold: frosty morning. 10. Wet: showery all day. 11. Stormy, and wet P.M. 12. Stormy: dry: cold. 13. Clear and cold. 14. Slight showers. 15. Showers: violent wind. 16. Cold and stormy: frosty. 17. Cold and boisterous. 18. Frosty A.M.: very cold. 19. Cold and withering. 20. Still cold and barren. 21. Hoar frost A.M.: dull evening. 22. Dull and cloudy: no frost. 23. Slight rain A.M.: cleared up. 24. Slight rain A.M.: cleared up. 25. Cold and ungenial. 26. Very withering. 27. Hoar frost A.M. 28. Still withering. 29. Looking like rain. 30. Rain: cleared up P.M.

Meteorological Observations made at the Apartments of the Royal Society by the Assistant Secretary, Mr. ROBERTSON; by Mr. THOMPSON at the Garden of the Horticultural Society at Chiswick, near London; by Mr. VALL at Boston, and by Mr. DUNBAR at Applegarth Manse, Dumfriesshire.

| Days of Month. | Barometer. | | | | Thermometer. | | | | Wind. | | | | Rain. | | | Dew-point. | |
|----------------|--------------------------|-----------|--------|-----------------|------------------|-----------------------------------------|-----------|------|------------------|--------------------------|-----------|------------------|--------------------------|-----------|---------|------------|-----------|
| | London: Roy. Soc. 9 a.m. | Chiswick. | | Boston. 84 a.m. | Dumfries. 9 a.m. | London: Roy. Soc. Self-register. 9 a.m. | Chiswick. | | Dumfries. 9 a.m. | London: Roy. Soc. 9 a.m. | Chiswick. | Dumfries. 9 a.m. | London: Roy. Soc. 9 a.m. | Chiswick. | Boston. | | Dumfries. |
| | | Max. | Min. | | | | Max. | Min. | | | | | | | | | |
| 1888. | | | | | | | | | | | | | | | | | |
| April. | | | | | | | | | | | | | | | | | |
| 1. | 30-204 | 29-142 | 29-140 | 29-83 | 30-12 | 30-02 | 34-5 | 51-6 | 30-3 | 45 | 16 | 36 | 30 | 30 | ... | ... | |
| 2. | 30-056 | 29-094 | 29-950 | 29-57 | 29-85 | 29-80 | 36-3 | 40-8 | 29-8 | 49 | 29 | 35 | 32 | 33 | ... | ... | |
| 3. | 29-978 | 29-991 | 29-939 | 29-54 | 29-72 | 29-61 | 39-4 | 47-3 | 34-3 | 58 | 39 | 38 | 38 | 42 | ... | ... | |
| 4. | 29-998 | 29-022 | 29-916 | 29-38 | 29-63 | 29-70 | 47-8 | 49-7 | 39-3 | 60 | 41 | 48-5 | 46 | 44 | ... | ... | |
| 5. | 30-014 | 30-033 | 29-903 | 29-45 | 29-60 | 29-50 | 51-4 | 55-2 | 44-9 | 59 | 46 | 50 | 44 | 43 | ... | ... | |
| 6. | 29-706 | 29-753 | 29-709 | 29-13 | 29-45 | 29-50 | 52-8 | 56-9 | 48-3 | 60 | 49 | 52 | 45 | 39 | ... | ... | |
| 7. | 29-550 | 29-587 | 29-500 | 29-63 | 29-24 | 28-83 | 51-7 | 58-3 | 50-3 | 52 | 39 | 51 | 42 | 36 | ... | ... | |
| 8. | 29-188 | 29-666 | 29-236 | 28-70 | 29-10 | 29-42 | 41-8 | 52-8 | 41-5 | 51 | 38 | 41 | 5 | 37 | ... | ... | |
| 9. | 29-762 | 29-997 | 29-767 | 29-37 | 29-64 | 29-65 | 43-7 | 49-6 | 40-0 | 52 | 32 | 40 | 37 | 38 | ... | ... | |
| 10. | 30-060 | 30-155 | 30-071 | 29-52 | 29-59 | 29-75 | 50-7 | 51-5 | 41-2 | 64 | 35 | 44 | 43 | 43 | ... | ... | |
| 11. | 30-184 | 30-188 | 30-053 | 29-56 | 29-78 | 29-75 | 54-0 | 59-2 | 48-8 | 69 | 35 | 55 | 46 | 35 | ... | ... | |
| 12. | 30-230 | 30-265 | 30-212 | 29-53 | 29-90 | 29-09 | 49-6 | 54-2 | 43-0 | 59 | 32 | 48-5 | 44 | 36 | ... | ... | |
| 13. | 30-276 | 30-287 | 30-081 | 29-77 | 30-09 | 29-85 | 47-0 | 56-4 | 38-0 | 52 | 32 | 43 | 42 | 42 | ... | ... | |
| 14. | 29-586 | 30-015 | 29-991 | 29-53 | 29-83 | 29-60 | 46-2 | 50-8 | 43-8 | 54 | 42 | 45-5 | 43 | 42 | ... | ... | |
| 15. | 29-792 | 29-803 | 29-717 | 29-23 | 29-40 | 29-38 | 47-0 | 50-3 | 44-2 | 61 | 35 | 49 | 46 | 35 | ... | ... | |
| 16. | 29-718 | 29-758 | 29-644 | 29-15 | 29-39 | 29-40 | 43-5 | 56-8 | 37-8 | 46 | 29 | 42 | 39 | 34 | ... | ... | |
| 17. | 29-628 | 29-753 | 29-057 | 29-16 | 29-43 | 29-60 | 40-8 | 46-7 | 33-3 | 47 | 32 | 40 | 39 | 34 | ... | ... | |
| 18. | 29-724 | 29-787 | 29-762 | 29-33 | 29-66 | 29-74 | 38-7 | 46-3 | 34-4 | 46 | 32 | 38-5 | 31 | 32 | ... | ... | |
| 19. | 29-716 | 29-773 | 29-751 | 29-36 | 29-74 | 29-70 | 36-2 | 44-7 | 34-4 | 45 | 26 | 38 | 38 | 34 | ... | ... | |
| 20. | 29-772 | 29-694 | 29-754 | 29-40 | 29-74 | 29-70 | 41-3 | 44-0 | 35-3 | 46 | 32 | 37 | 42 | 33 | ... | ... | |
| 21. | 29-658 | 29-691 | 29-624 | 29-24 | 29-47 | 29-19 | 41-8 | 44-0 | 36-2 | 52 | 30 | 41 | 40 | 39 | ... | ... | |
| 22. | 29-182 | 29-353 | 29-320 | 28-90 | 29-07 | 29-18 | 41-9 | 48-3 | 36-8 | 52 | 37 | 43-5 | 42 | 41 | ... | ... | |
| 23. | 29-372 | 29-399 | 29-320 | 29-03 | 29-19 | 29-30 | 50-3 | 51-5 | 41-0 | 57 | 36 | 51-5 | 40 | 40 | ... | ... | |
| 24. | 29-460 | 29-703 | 29-465 | 29-14 | 29-58 | 29-74 | 44-8 | 54-7 | 40-8 | 56 | 31 | 47 | 43 | 40 | ... | ... | |
| 25. | 29-740 | 29-759 | 29-618 | 29-59 | 29-40 | 29-86 | 47-0 | 50-6 | 38-2 | 52 | 42 | 43 | 43 | 43 | ... | ... | |
| 26. | 29-864 | 29-015 | 29-891 | 29-52 | 30-01 | 30-05 | 46-0 | 51-0 | 43-0 | 49 | 35 | 45 | 44 | 38 | ... | ... | |
| 27. | 29-026 | 29-975 | 29-921 | 29-59 | 29-98 | 29-98 | 43-8 | 47-2 | 37-8 | 49 | 32 | 43 | 44 | 36 | ... | ... | |
| 28. | 29-640 | 29-679 | 29-748 | 29-45 | 29-85 | 29-71 | 43-8 | 47-7 | 35-0 | 52 | 32 | 43 | 45 | 39 | ... | ... | |
| 29. | 29-708 | 29-740 | 29-712 | 29-31 | 29-69 | 29-53 | 41-2 | 50-4 | 36-2 | 50 | 34 | 43 | 40 | 36 | ... | ... | |
| 30. | 29-546 | 29-589 | 29-535 | 29-11 | 29-29 | 29-35 | 45-7 | 47-0 | 38-8 | 56 | 44 | 36-5 | 37 | 35 | ... | ... | |
| Mean. | 29-792 | 29-835 | 29-738 | 29-33 | 29-63 | 29-62 | 44-7 | 50-9 | 39-2 | 53-3 | 34-8 | 43-6 | 40 | 38 | Sum. | 1-68 | |
| | | | | | | | | | | | | | | | -66. | 1-16 | |
| | | | | | | | | | | | | | | | | Mean. | |
| | | | | | | | | | | | | | | | | 37-9 | |

ANNALS OF NATURAL HISTORY.

XXXVII.—*Florula Keelingensis. An Account of the Native Plants of the Keeling Islands.* By the Rev. J. S. HENSLOW, M.A., Professor of Botany in the University of Cambridge.

THE Keelings consist of small coral islands, ranging in a circle, and inclosing a lagoon or salt-water lake of nine and a half miles in its longest diameter. They lie in lat. $12^{\circ} 5'$ S., and long. $90^{\circ} 55'$ E., very nearly 600 geographical miles to the S.W. of Java Head or the Straits of Sunda. They stand apart from any other group or archipelago, and the naturalist is curious to learn the character of their productions. Mr. Darwin, who accompanied the *Beagle* in her late voyage round the world, visited these islands in 1836, and is about to give an account of their geological conditions, as well as of the scanty zoology which they furnish. As he obligingly presented me with the plants which he collected, together with his memoranda respecting them, I have thought that a list of the species, accompanied by a few remarks might be of interest; and chiefly as serving to point out a set of plants whose seeds must be provided in a very eminent degree with the means of resisting the influence of sea water. For the satisfactory determination of the geographical distribution of species, it is necessary to be extremely careful in discriminating the species and even varieties which occur in different regions, and I have therefore generally added a few remarks on the state of the individual specimens in question, that every one may form a better estimate of the degree of probability of each having been correctly identified.

The largest of the islands is about five miles long and a quarter of a mile broad. Some sand hillocks on it are thirty feet in height, but the general level does not exceed six or eight feet. The foundation of all of them is a solid coral reef, which receives continued additions from fragments of coral and sand brought by the waves and wind. The soil is entirely

composed of broken corals and shells, sometimes in the form of calcareous sand; and the quantity of vegetable mould is extremely small. Twenty-three of the islands bear trees; and there are many others of small dimensions, scarcely elevated above the surface of the ocean, which produce none. When first seen, nothing can be observed but a belt of cocoa-nut trees encircling the lagoon. The abundance in which these occur has tempted a respectable Englishman named Ross to bring his family and settle here. He has with him a party of about eighty Malays, who are employed in manufacturing cocoa-nut oil; and the nuts also are exported to Mauritius and Singapore. Thrown as these men are so completely upon their own resources, they have accurately investigated the natural productions of the islands, and readily pointed out to Mr. Darwin the different species of plants, and assured him that he had seen them all except one, of which there was only a single tree, bearing a large square and very hard nut, growing on one of the islands which he did not visit. Excepting the cocoa-nut, and one other tree which was not in flower, and which attains a diameter of five or six feet, with particularly soft wood, Mr. Darwin brought away specimens of all the species he saw, amounting to twenty-one.

From the character of the soil and the condition of the islands we might expect *à priori* to meet with a purely littoral flora, and with none but extensively sporadic species. Mr. Darwin heard of the trunks of trees, of many seeds, and of old cocoa-nuts being washed on shore from time to time, and probably all the species which have thus been introduced are to be found in the East Indian Archipelago, or on the neighbouring continent, though they have not all been noticed there. Two at least of the species appear to be hitherto undescribed, and one or two others possess an interest from their rarity, and the little information we possess concerning them; but all the rest have an extensive range throughout the intra-tropical regions.

Of the few imported plants the banana does not thrive well; the sugar cane has in some parts run wild, but has lost greatly in flavour, as also has the tobacco. Besides these a little maize and a few vegetables are cultivated. Three species

of grass had been introduced, (*Panicum*, *Eleusine indica*, and *Poa plumosa*), as was stated, from Java, under an impression that goats would not eat the rank herbage of the island; but the settlers were surprised to find that one of these animals left on the islands by Capt. Fitzroy preferred the native to the imported species.

As the flora of the island of Timor, which lies nearly due west of the Keelings without any intervening land, has lately been described by Mons. Decaisne, I have placed a (T) in the following list opposite those species which he has recorded in his very excellent 'Herbarium Timorense.'

List of the Plants Indigenous to the Keelings.

| | | | |
|------------------------------------------------------|----|---------------------------------------------------|----|
| MALVACEÆ. | | CINCHONACEÆ. | |
| 1. <i>Paritium tiliaceum</i> , <i>St. Hil.</i> | T. | 11. <i>Guettarda speciosa</i> , <i>Linn.</i> | T. |
| TILIACEÆ. | | CORDIACEÆ. | |
| 2. <i>Triumfetta procumbens</i> , <i>Forst.</i> | | 12. <i>Cordia orientalis</i> , <i>R. Brown.</i> | T. |
| LYTHRACEÆ. | | BORAGINACEÆ? | |
| 3. <i>Pemphis acidula</i> , <i>Forst.</i> | T. | 13. <i>Tournefortia argentea</i> , <i>Linn.</i> | T. |
| PORTULACACEÆ. | | ACANTHACEÆ. | |
| 4. <i>Portulaca oleracea</i> . | | 14. <i>Dicliptera Burmanni</i> , (var.?) | |
| LEGUMINOSÆ. | | <i>Nees.</i> | |
| 5. <i>Guilandina Bonduc</i> , <i>Hort. Kew.</i> | T. | APOCYNACEÆ. | |
| 6. <i>Acacia</i> (<i>Farnesiana</i> ?) <i>Linn.</i> | T. | 15. <i>Ochrosia parviflora</i> . | |
| URTICACEÆ. | | GRAMINEÆ. | |
| 7. <i>Urcra Gaudichaudiana</i> , <i>n. s.</i> | | 16. <i>Panicum sanguinale</i> , (var.?) | |
| AMARANTHACEÆ. | | <i>Linn.</i> | T. |
| 8. <i>Achyranthes argentea</i> (var.?) | | 17. <i>Stenotaphrum lepturoide</i> , <i>n. s.</i> | |
| <i>Lam.</i> | T. | 18. <i>Lepturus repens</i> , <i>Forst.</i> | |
| NYCTAGINACEÆ. | | PALMÆ. | |
| 9. <i>Boerhavia diffusa</i> , <i>Willd.</i> | T. | 19. <i>Cocos nucifera</i> , <i>Linn.</i> | T. |
| var. β .? | | MURCI. | |
| var. γ .? | | 20. <i>Hypnum rufescens</i> , <i>Hooker.</i> | |
| SCÆVOLACEÆ. | | FUNGI. | |
| 10. <i>Scævola Koenigii</i> , <i>Vahl.</i> | T. | 21. <i>Polyporus lucidus</i> . | |
| | | 22. } Two trees of which no spe- | |
| | | 23. } cimens were procured. | |

1. *Paritium tiliaceum*.—Leaves large, and the linear pore upon one to five of the nerves on the under side.

"Common on one of the islands. It is exceedingly useful throughout the Pacific; and in Otaheite particularly, the bark is employed in the manufacture of cordage, whilst the light wood is used by the fishermen for floats. The natives readily procure fire from the wood by friction."—*C. Darwin.*

2. *Triumfetta procumbens*. Forster, Prod. n. 204.—This species is placed by De Candolle among those "non satis notæ." By Mr. Brown's kindness I have satisfactorily iden-

tified it, by comparison with Forster's original specimens in the British Museum. As much uncertainty prevails respecting the number of species in the genus, I shall add a detailed description of the present specimens. Messrs. Wight and Arnott have observed, at page 74 of their *Prod. Floræ Indiæ*: "In this genus it may be right to caution the student to place no reliance on the shape of the leaves or their pubescence, or suppression of the parts of the flower." To this we would add further, that neither can much reliance be placed upon the character of the inflorescence, since the differences between the peduncles being axillary or opposite, seem chiefly to depend upon different degrees of luxuriance.

Speciminum Keelingensium caules ramosi, ramis tomentosis, pubescentiâ stellatâ. Folia longè petiolata, subrotunda vel latè-ovata, cordata, indivisa vel trilobata, inæqualiter serrato-crenata: suprâ nudiuscula, subtus petiolisque incano-tomentosa, marginibus nudis subglandulosis. Stipulæ lanceolatæ. Pedunculi inferiores axillares, sub-abortivi; superiores oppositifolii, foliorumque superiorum abortione sub-corymbosi, horumque stipulis bractæas emulantibus; pedicellis 3—5 sub-umbellatim dispositis. Calyx, sepalis 5 linearibus, sub apice acuminatis, extus pubescentibus, æstivatione valvatis. Corolla, petalis 5, sepalis parum minoribus, obovatis, unguibus basi villosis. Stamina 25, petalorum longitudine. Pistillum ovario ovali, hispido; stylo lineari, hirtò, tricuspidato. Capsula junior globosa uncinato-hispida.

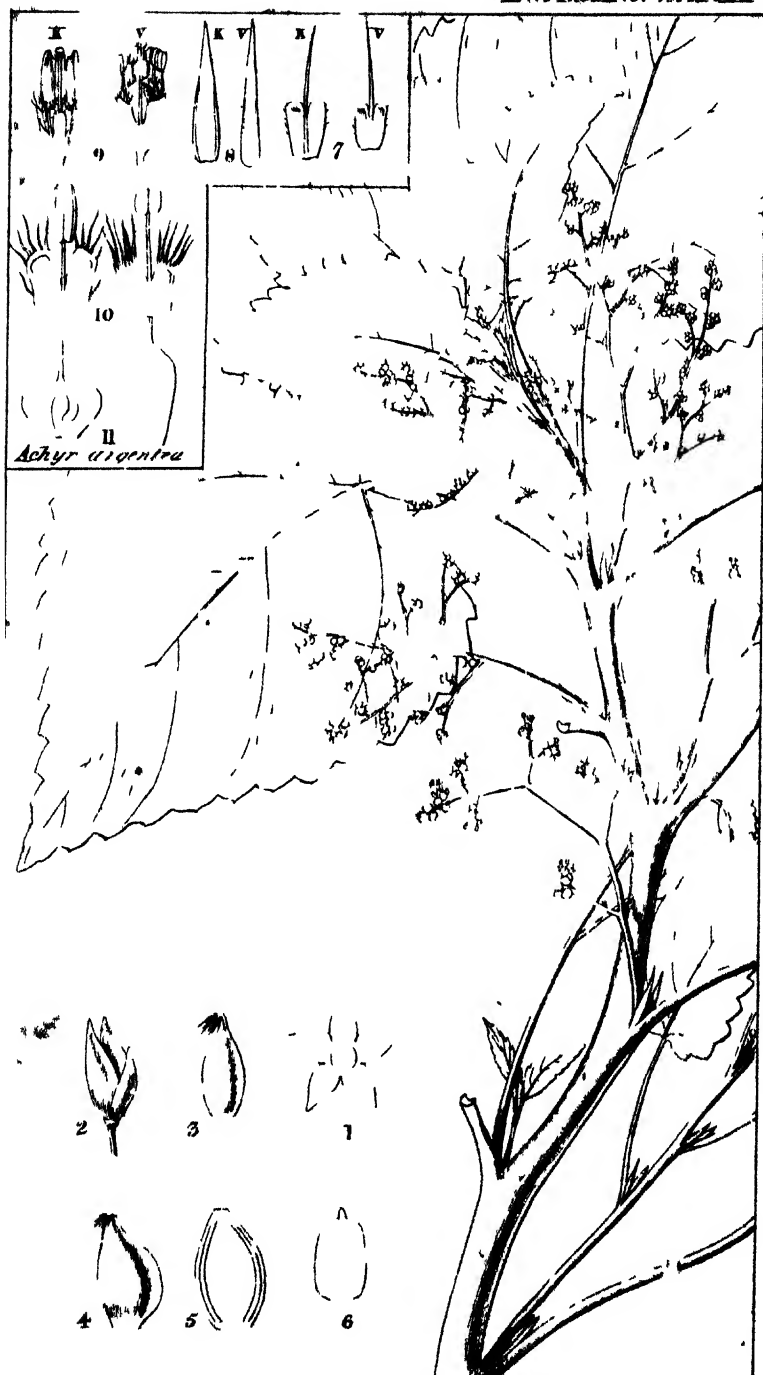
3. *Pemphis acidula*.—The capsules burst by an irregular transverse fissure about the middle, with the lower portion more membranous than the upper. Forster describes them as having six valves, and Lamarck as opening transversely at the base.

"No sooner has a new reef become sufficiently elevated by the accumulation of sand upon its surface, but this plant is sure to be the first which takes possession of the soil."—*C. Darwin*.

4. *Portulaca oleracea*.—The specimen is in seed, tolerably luxuriant, and seems unquestionably to belong to this species; but there are some minute hairs in the axils, which is not generally the case, and not characteristic of the section to which it belongs.

5. *Guilandina Bonduc*.—The specimen is only in bud.

"Grows only on one islet."—*C. Darwin*.



6. *Acacia* (*Farnesiana* ?)—The specimen has no signs of inflorescence, but the herbage closely resembles that of *Farnesiana*; and as that species grows in Timor, it is probably the same.

“On the same islet with the last.”—*C. Darwin*.

7. *Urera Gaudichaudiana*. Plate XI.

Caule herbaceo; foliis longè petiolatis, latè cordatis, sub-acuminatis, grossè serratis, undique pilis brevibus conspersis, subtus pallidioribus; cymis axillaribus divaricato-dichotomis petiolis subæqualibus.

I have named this species in honour of Mons. Gaudichaud the founder of the genus *Urera*, who has attempted to group the species of this much-neglected order in the volume devoted to the botany of the ‘Voyage de l’*Uranie*.’ The only described species to which it seems to approach is the *Urtica ruderalis* of Forster, but a comparison with his original specimen in the British Museum has shown me that it is perfectly distinct.

The single specimen brought home by Mr. Darwin consists of part of an herbaceous stem about seven inches long, belonging apparently to a perennial. From each of the axils of the two lowermost leaves proceeds a short branch, and from each of seven or eight others spring divaricate branching cymose panicles about four inches long. The petiole and limb of the largest leaf are each four inches long, and the latter is $2\frac{1}{2}$ inches broad. The inferior panicles produce male flowers on their lower branches and female on their upper; but the superior bear female only. Male flowers crowded in small heads at the extremities of the short branches, their calyx deeply 5-partite (fig. 1.); stamens 5. Female flowers smaller than the males, their calyx of three sepals, or rather of two sepals and an external bract (fig. 2.); the pistil solitary, ovary ovate and slightly oblique (fig. 3.); the stigma crowned with a ferruginous tuft of hair inclining to one side. The ripe pericarp obliquely-ovate or gibbous (fig. 4.) containing one erect sessile exalbuminous seed (fig. 5.) with the embryo inverted (fig. 6).

8. *Achyranthes argentea* (var. ? *villosior*.)

foliis breviter pedicellatis, oblongis, basi sub-attenuatis, superne villosis, subtus incano-sericis.

There are two specimens of this, each about a foot long, with the terminal spike on one of them six inches, on the other not two. Largest leaves three inches. It is difficult to decide whether this ought to be considered a new species or only a variety of *argentea*.

Decaisne considers *argentea* and *aspera* to be identical. The very variable character of the herbage prevents our laying any great stress upon the shape of the leaf, length of the spike, or degree of pubescence. In these respects our plant comes within the character of *argentea* given by Decaisne in the 'Flora Timorensis.'

On comparing the several parts of the flower with those of another specimen of *argentea*, brought by Mr. Darwin from the Cape-de-Verd Islands, I find several remarkable differences, which I may here describe.

Comparison of the parts of the flower in specimens of Achyranthes argentea from the Keelings and Cape-de-Verd. Plate XI. where K. means Keeling, and V. Cape-de-Verd Islands.

| KELLING. | CAPE-DE-VERD. |
|--------------------------------------------------------------------------------------------|----------------------------------------------------|
| Fig. 7. <i>Bract</i> . Auricles at base, about half the length of the bract. | About one third the length. |
| 8. <i>Sepal</i> . | |
| 9. <i>Stamens and pistil</i> . | |
| 10. <i>Stamen, with part of connecting membrane</i> . | |
| <i>Anther</i> . Elliptic-oblong, equal to free portion of filament. | Subrotund and much shorter. |
| <i>Fringed lobes</i> (from abortive stamens?) with few and regular incisions. | Incisions numerous and very irregular. |
| 11. <i>Pistil</i> . Ovary ob-ovato-globose, depressed, with the style three times as long. | Ob-ovato-cylindrical, with the style half as long. |

The position and form of the ovule is also marked on the figures.

9. *Boerhavia diffusa*.—After an attentive examination of Mr. Darwin's specimens, I cannot detect sufficient differences to class them under more than one species, though he had himself concluded, from certain peculiarities in their habit whilst growing, that they must belong to three. These three forms, which I consider to be varieties of the *diffusa* of Decaisne's Herb. Timor., have each long, weak, straggling, terete branches, clothed with close scattered pubescence, except on the older parts, which are glabrous. The leaves are stalked

and fleshy, modifications of ovate and repand. The flowers in small heads, which themselves are arranged in dense umbels, with long axillary peduncles alternately disposed among the uppermost parts of the branches.

Var. a. Stoutest in habit, and with the largest leaves, the lowermost of which have their limb an inch long, with peduncles of half an inch; all are pedunculate, ovato-rotund, often slightly sub-cordate, much paler beneath. Stamens 2—3; young fruit ob-clavato-fusiform.

Var. β. Branches more than three feet long. Leaves rather smaller and darker on each side, generally more acute, the uppermost nearly or quite sessile. Seems to be *B. diandra* of Bur. Fl. Ind., tab. 1. fig. 1. Stamens 2—4, alternate with the segments of the calyx; anther with two globose cells, which, with the filaments, are pilose. Ovary oval, but in the young fruit becomes fusiform and angular, with glandular hairs. Stigma peltate. A toothed annulus round the calyx was noticed in one specimen. Three or four bracts.

“Grows upright and untidy, and is the commonest weed, growing everywhere.”—*C. Darwin.*

Var. γ. Branches a foot and a half long. More stunted, with fewer, smaller, and more fleshy leaves. Stamens 2—3.

“Grows close to the ground, and is abundant on one spot within ten or twelve yards of the sea, where it was pointed out to me as possessing an esculent root, and considered to be quite distinct from var. β.”—*C. Darwin.*

A specimen of the root was preserved, and consists of long wiry branches, which do not appear to have been ever very succulent.

10. *Scævola Kœnigii*.—The leaves are seven inches long and three broad, quite glabrous; the apex slightly retuse and the margin somewhat repand. Segments of the calyx subulate and glabrous. Corolla with the base of the tube slightly villose within, the segments of the limb lanceolate and glabrous. Cupula of the stigma very pilose within. This specimen appears to be more glabrous than usual, whilst *S. sericea* (of which I have specimens from Macao in China) differs from the more usual state of *S. Kœnigii* chiefly in being more decidedly pubescent.

11. *Guettarda speciosa*.—Largest leaves eleven inches long and nine broad. Corolla with seven or eight segments. Stamens 7—8. Ovary seven cells with a pendulous ovary in each. Stigma eight rays. Pollen intermixed with numerous fibres (pollen tubes?).

“The flowers possess a delightful perfume.”—*C. Darwin*.

12. *Cordia orientalis*.—“The settlers have named this Keeling-teak, because it furnishes them with excellent timber. They have built themselves a vessel with it. A large tree, abounding in some of the islands, very leafy, with scarlet flowers; but only a few blossoms were expanded at the time, and they easily fell off.”—*C. Darwin*.

13. *Tournefortia argentea*.—Cyme ten inches long, bearing both flower and fruit. Leaves oblong and obovate-oblong, attenuated below.

“A moderate sized tree, with small white flowers, very common.”—*C. Darwin*.

14. *Dicliptera Burmanni*, var. ?—Some of Nees von Esenbeck's species (in Wallich's Pl. As. Rar. vol. iii. pp. 111, 112,) run so closely together, that it is difficult to say whether he would have referred these specimens to *Burmanni* or not. I will here subjoin a full description of them, and it may serve future observers in either extending the character of *Burmanni*, or of reuniting with it some of the other forms now considered to be distinct species, but formerly combined under the name of *Justicia chinensis*.

Radix annua ramosa. Caulis obsoletè tetragonus. Folia inferiora 1 pollices longa, 2½ lata, petiolo unciali, subglabra strigosave, subtùs pallidiora, cum caule lineolata; foliorum margines pilis minutis appressis tectæ, et basin versus aliquando piloso-ciliatæ. Axillæ plerumque florifere. Pedunculi 4—6 in quâve axillâ seriatim dispositi, 1—2 lineares, majores interiores. Capitula 1—2-flora. Bractæ primariæ (sive umbellarum) plerumque subulato-cuspidatæ, pungentes, 6-lineares; aliquando inter umbellas inferiores eâdem secundariarum formâ, sed majores et foliaceæ. Bractæ secundariæ (sive capitulorum) vel subpachulatæ vel obovatæ vel lanceolatæ vel lato-ovatæ, basi pallidiori attenuato, nervo medio valido, in apicem cuspidato-mucronatum excurrente, hirsutæ, pilis longis articulatis glandulisque interjectis ciliatæ. Bractæ tertiariæ (sive florum bracteolæ) binæ setaceæ, calyce sublongiores. Calyx subsessilis minutus 5-partitus, laciniis subsetaceis, bracteolisque hirsutæ et ciliatæ. Corolla 7-linearis, tubo pallido, limbo roseo bila-

biato, labio superiore breviter 3-dentato, inferiore obsolete 2-dentato, externe pubescens. Capsula orbicularis, tomentosa, compressa ungue brevi dorsaliter compresso. Semina duo, orbicularia, compressa, muricata, primum pallide denique autem saturatissime brunnea.

15. *Ochrosia parviflora*.—This is unquestionably the *Cerbera parviflora* of Forster Prod. n. 121., as Mr. Brown showed me by comparison with the original specimens in the British Museum; but Dr. Hooker's *C. parviflora*, in Beechy's Voyage, p. 90, is certainly a distinct species, as I have ascertained by an examination of his specimens, kindly forwarded to me for comparison with Mr. Darwin's. Dryander, in the Linn. Trans., vol. ii. p. 227, asserts that he had compared Forster's specimens of *C. parviflora* with Commerson's of *Ochrosia borbonica*, and found them to be the same species. This has been since disputed. I have specimens of *Och. undulata* from Mauritius, labelled by Bojer as the "*Bois jaune*" of that island, which appears to identify that species with Jussieu's *Och. borbonica*. There is some obscurity in the descriptions hitherto given of the fruits of *Cerbera*, *Ochrosia* and *Tanghinia*, and I had hoped to have been able to have inserted here my own observations on them, but I must defer them until I have time to clear up one or two points about which I am doubtful. I should feel much obliged in the mean time to any botanist who can furnish me with specimens of the fruit of these, or any allied genera, for dissection. Mr. Darwin's specimens were accompanied by the following note: "Forms straight handsome trees, with smooth bark, which are commonly dispersed two or three together. The fruit is bright green, like that of the walnut." Two specimens of this fruit were brought home, and though Mr. Darwin feels confident that he *gathered* them, and, as he believes, from the same tree which bore flowers at the time, yet it has been supposed that they must belong to a species of *Cerbera*, and not to an *Ochrosia* which this plant seems to be; and I shall therefore defer their description for the present, merely intimating that I believe them to be identical with the *Cerbera platysperma* of Gaertner. The following is a detailed description of the flowering specimens from Keeling.

Folia subternata (quorum longiora cum petiolo sesquipedalia, limboque decem pollices longo sex lato), oblonga vel obovato-oblonga, subacumi-

nata, basi parum attenuatâ, subcoriacea, integerrima, glabra, subtus pallidiora, venis secundariis transversis parallelis, numerosis, supernè incurvantibus. Pedunculi axillares vel foliorum abortione extra-axillares et terminales, sub-ternatim verticillati, petiolis longiores supernè di-tri-chotomi. Flores breviter pedicellati bracteis binis suffulti, densè corymbosimque dispositi. Calyx parvus 5-partitus. Corolla semuncialis fauce parum inflatâ, limbo quinquifido. Stamina 5, antheris acuto-ovatis, filamentis brevibus. Pistillum è carpellis duobus in ovarium biloculare primùm accretis, subito in drupellas duas sex ovulatas segregans; ovulis 2—4 solummodo maturascentibus?

16. *Panicum sanguinale*, var. ?.—I quote this species with doubt, because the only specimen has the spikes half starved and the spikelets not fully matured. It has much the habit of *P. pruriens* of Trinius Gram. Icones, with a trailing stem of four feet, but the glumes have the relative proportions ascribed to *P. sanguinale*, and the margins of the superior one are very hirsute. There are thirteen spikelets, but three or four towards the summit are quite abortive. They are arranged in two whorls of four in each; one is below the lowest whorl, and the other four are scattered between the two whorls. As Decaisne gives *P. sanguinale* as a Timor plant, the present may the more probably be only a form of this.

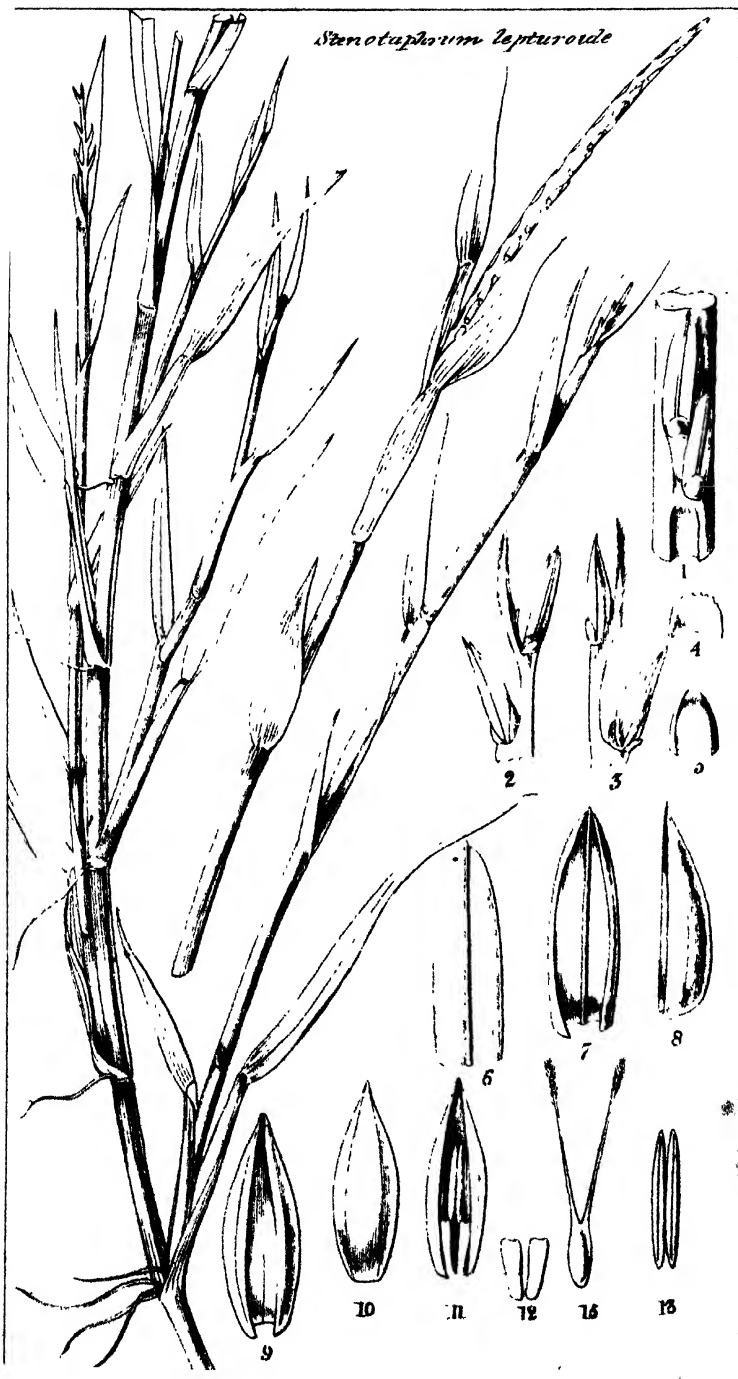
17. *Stenotaphrum lepturoide*. Plate XII.

Spiculis subduabus alternatim dispositis, unâ rachi sessili, alterâ pedunculatâ, foliis lanceolatis lineari-lanceolatisque.

Mr. Brown showed me a single specimen of this grass among Forster's specimens of *Lepturus repens* in the British Museum, and the general resemblance which it may be considered to bear to that plant has induced me to give it the specific name of *lepturoide*. It departs from the generic character of *Stenotaphrum*, given in Kunth's *Agrostographia*, in not having the spikelets arranged unilaterally, and in the rachis of the spike being terete or very nearly so; but in all essential points it is truly a *Stenotaphrum*, as the following detailed description will be sufficient to show.

Culmi pedales et ultrâ, ramosi, procumbentes vel supernè solummodo ascendentes, plerumque fertiles, glabri, compressi, nodis brunneis. Folia lanceolata vel lineari-lanceolata, acuta, plana, nervis 9 subprominulioribus, intermedio subtus validiore, membranaceo-rigida, utrinque glabra, marginibus obsolete scabriusculis, 1—2 poll. longa, 1½—3 lin. lata. Vaginæ ad basin fissæ, marginibus primùm ciliato-pilosis, ore pilosior, unipollicares, plerumque solutæ. Ligulæ obsoletæ, vel in lacinias breves resolutæ. Spicæ in apice ramorum solitariae, basi è

Stenotaphrum lepturoide



summâ vaginâ exsertâ, subincurvantes, 3—4 poll. longæ; rachi tereti, vel paululum compressâ (fig. 1.) acutâ, internè spongiosâ, vix lineam latâ, pro insertione spicularum utrinque excavatâ. Spiculæ per binas (fig. 1.) (vel inferne per ternas), quarum una sessilis, altera pedicellata (figs. 2, 3.), ovato-oblongæ, lineæ dimidio longiores, bifloræ, flore inferiori unipaleaceo (figs. 6, 7.) neutro; superiori hermaphrodito (fig. 8.) bipaleaceo. Glumæ duæ subæquales (figs. 4, 5.) concavæ, enerviæ, membranaceæ, glabræ, spiculâ quadruplò breviores, ovato-ellipticæ, exterioris (fig. 4.) apice sub-truncato eroso. Flos neuter è paleâ unicâ ovato-ellipticâ dorso planâ (fig. 6), nervis 3 prominulis, medio sub-carinante excurrente acutâ, glaber, coriaceus, florem hermaphroditum unilateraliter amplexens et paululum superans. Flos hermaphroditus (fig. 8.) ovato-oblongus, sub-acuminatus, externe convexus, interne planiusculus, pallidus, levis, glaber, paleis duobus, quarum inferior (fig. 9.) oblongo-ovata, acuta, concava, trinervis, superiorem amplexens, membranaceo-chartacea; superior (figs. 10, 11.) ovata, binervis, concava, dorso (fig. 10.) planiuscula, marginibus inferne inflexis. Squamulæ (lodiculæ) (fig. 12.) duæ anticæ, collaterales, truncato-lineares, ovario longiores. Stamina 3, antheris (fig. 13.) lineari-oblongis. Ovarium (fig. 15.) oblongum, apice in stylos duos elongatos attenuatum. Stigmata stylis duplò breviora, plumosa, pilis brevioribus, simplicibus, hyalinis.

18. *Lepturus repens*.—"Occurs in salt places, in the interior of the islands."—C. Darwin.

19. *Cocos nucifera*.—Although no specimen of this was brought home, yet as the Keelings are also called Cocos Islands, and as they have been recently colonized for the express purpose of trading in the oil and fruit, we may safely assert it to be abundant.

20. *Hypnum rufescens*.—The specimens were submitted to Dr. Hooker, who remarks, "In a very indifferent state certainly, but I think it may safely be referred to *H. rufescens*, Hooker and Arnott, of Bot. of Beechy's Voyage, page 76, t. 19. It is in a younger and greener state."

21. *Polyporus lucidus*.—These were sent to Mr. Berkeley with a query, whether they might not be *P. australis*; to which he replies, "I have no doubt your fungus is *P. lucidus*. I have before me specimens of precisely the same thing from Mauritius, together with a distinct variety resembling, I should imagine, *P. australis*. That, however, is a perennial species, and the substance is very hard; whereas your plant is at most biennial, and the substance soft and spongy."

XXXVIII.—On *Fishes new to Ireland*. By WILLIAM THOMPSON, Esq., Vice-President of the Natural History Society of Belfast.

IN the course of a communication which I had the honour of bringing before the Zoological Society of London, on the 13th of June, 1837, were a number of fishes new to Ireland, but which, being known as British species, were introduced in little more than a catalogue form, and so published in the Proceedings of the Society. As the species are chiefly rare, the following notes respecting them are brought together, in the hope that they may prove acceptable for this publication.

TRIGLA CUCULUS, Bloch*. *T. Blochii*, Yarr., Red Gurnard.—Of this gurnard, two small specimens, taken at Youghal, county Cork, early in the summer of 1835, have, along with many other fishes from the same locality, been kindly submitted to my examination by Robert Bull, Esq., of Dublin.

They are respectively 3 and 3½ inches in length. The number of rays in their fins are

D. 8—19; P. 10, and 3; V. 1/5; A. 18 (and 19);

C. 10 (and 11).

A black spot is conspicuous from 3rd to 5th ray of 1st D. fin. P. fins extending so far as to be on a line with the origin of A. fin†. Dorsal spines, 27. Lateral line strongly serrated. "Whole body rough" (as described by Montagu, Wern. Mem., v. ii. p. 459) in consequence of spinous scales. Other characters as given by Cuvier and Valenciennes, Hist. des Pois. t. iv. p. 68, 69: in this work the relative length of the 1st and 2nd rays of the 1st D. fin is not mentioned‡, nor is it in

* The *T. Cuculus*, Bl., appears inadvertently in Mr. Templeton's catalogue of 'Irish Vertebrate Animals' (Mag. Nat. Hist., N.S., vol. i. p. 409), the species meant being the *T. pini*, Bl.

† These are generally described as not reaching so far as the vent, but their superior length in the present instance is probably consequent on the specimens being so young, as in several other genera of fishes I have remarked the P. fins in very young individuals to be much longer proportionally than they are in adult specimens.

‡ Notwithstanding the trouble taken by Cuv. and Val. in clearing up the synonyma of the *Trigla*, and which has been so ably done, there is still a little confusion in one point respecting this species. At p. 70 it is remarked that Risso has well described it; yet, on a comparison instituted between the

the descriptions of Bloch, Montagu, Fleming, or Jenyns. Mr. Yarrell not having a specimen for examination, states on the authority of Risso "that the first spinous ray of the first dorsal fin is the longest" (Brit. Fish. v. i. p. 51), and so figures it; but in both the specimens under consideration, the 2nd ray of that fin is longest, thus corresponding in this important character with Pennant's figure of the species. See Red Gurnard in Brit. Zool., v. iii. pl. 57. ed. 1776, and pl. 66. ed. 1812.

In the Magazine of Natural History for September 1836 (p. 463) Mr. Couch has given "a description of the characteristics of a kind of *Trigla*, hitherto confounded with *T. Blochii*." As it is from the description only of this species that the opinion of Mr. Couch was formed, it may be stated, as affording additional evidence of the correctness of his views, that after a critical comparison of the specimens under consideration with his description, I am satisfied—although the great disparity in size between the English and Irish specimens may be considered insufficient to warrant such a conclusion—that they are distinct.

The more prominent differences are—in the form of the snout; in the body of my specimens being very much rougher than that of *T. Hirundo*, with which Mr. Couch's fish agrees in this respect; in their lateral line being strongly and acutely serrated, although in the individual described by this gentleman, it "is but faintly though distinctly roughened."

Finally, it may be observed, with reference to this last fish being "hitherto confounded with *T. Blochii*," that the examination of my specimens convinces me that the *T. Cuculus* of Bloch, Cuvier, Pennant*, Montagu, Fleming and Jenyns re-

T. Cuculus and *T. Gurnardus*, there is nothing said of a difference in the length of the rays of the 1st D. fin. The "exactitude" of Pennant is at the same time acknowledged, although he represents the 2nd ray of this fin to be the longest, as Risso does the 1st. From this I should infer that Risso's character of "*radii pinna dorsali anteriore longissimus*" has been overlooked. And besides, Bloch's figure of the *T. Cuculus*, exhibiting the 1st and 2nd rays of this fin of equal length, is criticised by Cuv. and Val., and no remark made upon this discrepancy. Neither in Bloch's description is it stated that this species differs from other *Trigla* in the relative length of these fin-rays.

* Between the figures and descriptions of Bloch and Pennant there is some disparity; the latter author describes two spines on each side of the snout, the former four, which number my specimens possess. Bloch describes the lateral line as consisting of "*écailles épaisses, larges*," &c., which mine exhibit; whilst Pennant observes that "the side-line [is] nearly

presents but one species; that Mr. Yarrell's *T. Blochii*, excepting what is borrowed from Risso, is also identical, and, judging from Mr. Couch's description, that his *Trigla* is a different species.

MUGIL CHELO, Cuv., Thick-lipped Gray Mullet.—On endeavouring, in the spring of 1835, to identify the common mullet of Ireland with Cuvier's species in the 'Règne Animal,' I perceived its agreement with the few characters there attributed to *M. Chelo*, but before recording it as this species, awaited a comparison with a more detailed description. This has since been afforded me in the 'Histoire des Poissons' of the same illustrious author; and, together with the accompanying figure illustrative of the head of *M. Chelo*, confirms, beyond a doubt, the identity of the species.

In the justly valued works of Yarrell* and Jenyns†, Mr. Couch is mentioned as the only naturalist who has noticed the appearance of the *M. Chelo* on the British coast; but in a review of the 'British Fishes' in the Magazine of Zoology and Botany, it is remarked, "The thick-lipped grey mullet, reckoned so rare by Mr. Yarrell, as to have been seen only once by Mr. Couch, is the common species on the eastern shores of Scotland, where we believe his grey mullet is not known at all, or is at least far from common. At the mouths of rivers the former is taken in considerable numbers in autumn." Vol. i. p. 390. Every mullet that I have had the means of examining at Belfast, since first giving attention to them in March 1835, was of this species, as were likewise the only two individuals that I have seen from the southern coast of Ireland. These are in the collection of Mr. R. Ball, of Dublin, and were taken at Youghal in the county of Cork.

As information on the history of this species, at least as distinguished from others, is very scanty in all the British and continental works I have had the opportunity of consulting, I have thought proper to enter into the following detail.

Notwithstanding the great increase of shipping of late years at Belfast, the mullet is as plentiful in the bay as it was ever known to be by the few persons engaged in its capture. By smooth." Bloch again describes the caudal fin as forked, and figures it very much so; Pennant states that it is "almost even at the end," which it is in the individuals under consideration.

* History of British Fishes. † Manual of British Vertebrate Animals.

much the greater number are taken here in trammel or set-nets, but at low water the sweep or draught-net is used in the gulleys*, and also, in addition to the former kind, is employed in fishing for them within the flow of the tide in the river Lagan. They are generally sought for from about the middle of March until the beginning of October, and are occasionally taken before and after these periods. They probably never migrate far, as in two different years, in the month of January, dead individuals were washed ashore in the bay. The fishers are, for their own sake, entirely guided by the weather, which must be moderate, it being by night that the mullet is taken in the greatest numbers, as, by reason of the darkness, they cannot by leaping over it so well avoid the fatal net, though even then they occasionally so escape. In clear moonlight, and by day, fish of every size often clear the net, sometimes springing five and six feet over it, and when one has set the example nearly all are sure to follow it: having surmounted the meshy barrier, they sometimes take two or three additional leaps, and skim the surface beautifully before again subsiding beneath it. In the stillness of the night, it is said, that by leaping and plunging about, they make the water seem quite alive. In the bright sunny days of summer, which they evidently much enjoy, a whole shoal of mullet occasionally exhibit their dorsal fins above the surface of the water, and when there are neither nets nor other objects to obstruct them, may, in playfulness, be seen springing a few feet into the air. This generally occurs at high-water, when they appear to be more intent on roving about than feeding, and penetrate as far up the river as the tidal wave will bear them: at such times they have frequently been captured in May's dock, within the town of Belfast.

Of their time of spawning I cannot speak with certainty, nor have any individuals that came under my observation from March till September been in the least degree spent by it, all being firm and well-formed fish. When, on the 3rd of Janu-

* These are narrow and often deep channels of water intersecting the banks over which the tide flows. In using the draught-net here, the smaller fish in leaping over it sometimes alight on the banks—at this time dry—to their destruction.

ary, 1835, in search of marine productions outside the entrance to Strangford Lough, county Down, and accompanied by Mr. Hyndman, a specimen of this mullet, under 2 inches in length, was captured, and in the middle of September I have seen others of 9 inches in length.

They are chiefly found in the most oozy parts of the bay, and where the grass-wrack (*Zostera marina*) is abundant. In search of food they make considerable excavations, which the fishers distinguish by the name of mullet-holes*. The very few Basse (*Labrax Lupus*, Cuv.) taken in Belfast bay—seldom more than a single individual at a time—are generally captured along with *M. Chelo*, and are hence called “white mullet” and “king of the mullet”; the largest known to me as occurring within the last few years weighed 8 lbs.

The species of fish frequenting the coasts of Down and Antrim may be stated, in general terms, commonly to attain the extreme size with their kindred in the Mediterranean, and the *M. Chelo* proves not an exception, as specimens taken in Belfast bay have considerably exceeded in this respect any of those I find recorded to have been obtained in more southern seas†. The ordinary weight is from 2½ to 5 lbs.; the largest procured by the respective mullet-fishers (all intelligent men of other occupations, and who pursue this chiefly as a pastime) have varied from 8 to 12½ lbs. The heaviest of which I have heard, was taken in the day-time, by my relative, Richard Langtry, Esq., and, being accurately weighed, proved to be 14¾ lbs.: this gentleman has likewise captured several of 9 and one of 10 lbs. weight.

I shall here condense a series of observations made on this species at Belfast during the last three years. It will be seen that it is not obtained in any great quantity. On the 25th of March, 1835, about sixty individuals taken in the bay, and the first this season, were brought to market, where nearly all

* Pennant observes, that the grey mullet “keep rooting like hogs in the sand or mud, leaving their traces in form of large round holes.” Brit. Zool., vol. iii. p. 437, ed. 1812.

† Risso states that they attain the weight of 8 lbs. Cuv. and Val., judging from the size of the head, as represented in a collection of Spanish engravings, consider that the *M. Chelo* may attain two feet in length, t. xi. p. 51.

of them were alive when I saw them, though none had been less than three hours out of the water; they were from 16 to 20 inches in length. On the 27th and 28th larger fish were captured; several of equal length—2 feet—that I had weighed, were $5\frac{1}{2}$, 6, $6\frac{1}{2}$, 7 and 8 lbs., thus showing that the weight is rather a consequence of depth than length: all were equally firm and solid. About the 1st of May this year the greatest number occurred; in one net 7 cwt. were procured at a single draught, and on the same night about 9 cwt. by another boat. They were sold at 4*d.* per pound to the fish-vendors in the market, and retailed at 6*d.*; at these rates they have been throughout the season. The best fish brought in by the one boat weighed 7 lbs., by the other 11lbs. 12 oz., being the largest example obtained this year.

In 1836 the first mullet were taken on the 18th of March. The greatest quantity obtained any night during this year was on the 11th of April, when 2 cwt. was procured by one boat, and at the same time upwards of $2\frac{1}{2}$ cwt. by another. On the 13th of May many fine fish were taken; one which I weighed was $8\frac{1}{2}$ lbs., and several more, judging from appearance, were not less; these were about 2 feet long, and some individuals, apparently not heavier, were somewhat above this length. On the 12th of August a quantity was taken. On September the 13th I saw a few specimens about 9 inches long, on the 16th many of ordinary size, and on the 22nd several about a foot in length. With reference to the small fish, it must be remarked, that individuals of herring-size form part of the shoals in spring, but in the set-nets used at that period none under 2 lbs. are “mashed.” The smaller ones are all taken in draught nets, employed at a later period of the year. The largest fish obtained this season weighed $12\frac{1}{2}$ lbs. They were sold regularly at the same prices, wholesale and retail, as in 1835.

Towards the end of July, 1837, I on different occasions saw specimens about a foot in length, which were taken in the river Lagan, and with them, young herrings (*C. Harengus*), from 4 to 5 inches long, were captured. The greatest quantity of mullet secured this year at one draught was ninety-two fish, weighing 3 cwt.: they were obtained on the 10th of August.

Until the 22nd of September mullet were brought to market, and on this occasion in large quantity. The best fish of 1837 was about 10 lbs. weight. During these three years the largest captures were all made about Garmoyle, a deep portion of the bay, about three miles from town. This fish is sought for only with nets. An acquaintance out eel-spearing in the bay once struck and secured with his spear a mullet of 5 lbs. weight, as it was swimming on the surface of the water.

With reference to European mullets generally, it is remarked in the *Hist. des Pois. of Cuv. and Val.*: “*Les anciens, qui donnaient à tout une couleur poétique, ont en conséquence fait du muge le plus innocent, le plus juste des poissons ; tout au plus mangerait-il ceux qu’il trouverait morts,*” t. xi. p. 77. Mr. Couch, apparently from his own observation, says of the *M. Capito*, “it is indeed the only fish of which I am able to express my belief that it usually selects for food nothing that has life.” *Yarr. Brit. Fish.* vol. i. p. 204. With the *M. Chelo* it is however far otherwise, as the contents of the stomachs I have examined at various seasons, presented, from the minute size of the objects, many hundred-fold greater destruction of animal life than I have ever witnessed on a similar inspection of the food of any bird or fish. From a single stomach I have obtained what would fill a large-sized breakfast cup of the following species of bivalve and univalve mollusca (which had been taken alive)—*Mytilus edulis*, *Modiola Papuana* (of these very small individuals), *Kellia rubra*, *Skenea depressa*, *Littorina retusa*, *Rissoa labiosa* and *R. parva*, *Serpulæ* and *Miliolæ*. Of these mollusca, specimens of *Rissoa labiosa*, three lines in length, were the largest, and the *Kellia rubra*, from the smallest size to its maximum of little more than a line diameter, the most abundant. In the profusion of specimens it affords, the stomach of one of these mullets is quite a storehouse to a conchologist. In addition to these were various species of minute crustacea. The only inanimate matter that appeared, were fragments of *Zostera marina* and *Confervæ*, which were probably taken into the stomach on account of the adhering mollusca. To this nutritious food may perhaps be attributed the great size this fish attains in Belfast Bay.

In the ‘*Règne Animal*’ (t. ii. p. 232, 2nd ed.) Pennant’s

figure of the grey mullet in his *British Zoology* is referred to as *M. Capito*, but in the 'Hist. des Pois.' of Cuv. and Val. (t. xi. p. 66.) it is believed to represent *M. Chelo*. In this last work Donovan's figure of the mullet (Brit. Fish. pl. 15.) is considered a very good representation of *M. Chelo*. With this opinion I fully coincide, although Yarrell and Jenyns refer to both figures as *M. Capito**. The descriptions of Pennant and Donovan throw no light upon the subject, nor are we informed whence the specimens were obtained that served for their illustrations. Pennant's figure exhibits the longitudinal lines reaching about as far as they generally do in *M. Chelo*; but Donovan, on the other hand, portrays them as extending to the ventral profile: in the more important characters however of the form of the operculum and mouth, his figure represents this species. I may add, that its greater than ordinary depth, which induced Mr. Yarrell to remark that the proportions of Donovan's grey mullet approach "more closely to those of *M. curtus* than to those of the common grey mullet of this country" (Brit. Fish. vol. i. p. 211,) seems not to me, from the great diversity of depth in different individuals, to militate against its being the *M. Chelo*.

The following is a description of a specimen examined on the 21st of July. Total length, 22 inches; greatest depth, $5\frac{1}{4}$ in.; thickness, $3\frac{1}{4}$ in.; weight. 5 lbs. D. $4\frac{1}{8}$; A. $2\frac{9}{16}$; P. 17; V. $1\frac{1}{5}$; C. 14.—Br. 6. In form it well agrees with the detailed description of Cuv. and Val., t. xi. p. 51, *et seq.*† The colour of the back is, as there described, of a fine steel blue; thence it becomes gradually lighter towards the under surface, which is pure opaque white, glossed with silver; a blackish line extends throughout the centre of the first ten rows of scales, ending with the row beneath the base of the P. fin, and giving to the fish its lineated appearance. Entire top of the head and upper lip greyish black; sides of the head just behind the eyes deep gold colour; lower part of the head or base of the opercula pure white; irides purplish black; outer base of P. fin,

* Mr. Yarrell has taken it for granted that the Irish mullet is of this species, vol. i. p. 202.

† The scales generally agree in every particular with the description at p. 52, but some do not either in proportion or sculpture.

and the body above and below it, tinged with gold, remainder of the P., the D., C., and A. fins greyish black, the last becoming lighter posteriorly. V. fins white, tinged with very pale flesh colour.

This specimen accords with the description extracted by Mr. Yarrell from the 'Fauna Italica,' with one exception—"the rays of the spiny D. fin [are there stated to be] longer than half the depth of the body." Vol. i. p. 208. In this individual they are only $\frac{1}{2}$ of its depth. In another specimen 20 inches long, the 1st and 2nd D. rays are equal, and $1\frac{1}{2}$ inch long, the depth of the fish being about 5 inches. In an individual of 11 inches the 2nd D. ray is equal to one-half the depth, and in one of 10 inches is as 1 to $2\frac{1}{2}$. Owing to this species varying very considerably in depth, as elsewhere shown, this must necessarily be a very uncertain character.

From the statistical surveys of counties and other sources, we learn that mullet are taken in suitable localities around the whole coast of Ireland; but whether they be all of one species remains a question for future investigation.

Gobius GRACILIS, Jenyns, Slender Goby.—Upon examination of eighteen specimens—seven from the coast of Down, six from Louth, and five from Cork—of the *Gobius* which until lately has been considered *G. minutus*, I found one individual from Down and another from Louth to be the *G. gracilis* of Mr. Jenyns, (p. 387.) These specimens are distinguished from those of the *G. minutus* by having the "rays of the 2nd dorsal longer; these rays also gradually *increasing* in length instead of *decreasing*, the posterior ones being the longest in the fin;" and by having the "rays of the anal in like manner longer than in the *G. minutus*;" also in "the anal and ventral fins, which are dusky, approaching to black in some places, instead of plain white, as in the *G. minutus*." In addition to this difference in the colour of the fins, my specimens of *G. gracilis* have more black on the body generally than those of *G. minutus*, being so different in this respect as to have attracted my attention when they were first obtained.

CRENILABRUS RUPESTRIS, Selby, Jago's Goldsinny.—See Zoological Proceedings for 1837, p. 57, and Magazine of Zoology and Botany, vol. ii. p. 445.

SALMO ERIOX, Linn., Bull Trout.—Dec. 3, 1836. In Belfast market I selected from a basket filled with sea trout (*S. Trutta*), in high condition, three specimens of *S. Eriox*, which were taken along with them in the sea at Donaghadee in the county of Down. Their length is from 19½ to 21 inches; weight of each about 2¾ lbs. Two are males, having the lower jaw very slightly hooked*, the other is a female; the operculum differs much in the sexes; teeth on the vomer of one male and the female three in number, in the other male four; teeth generally much smaller in the female than in the males. Fin-rays with one or two exceptions are in the three specimens—D. 14, P. 14, V. 10, A. 11, C. 19.

In *colour* they are silvery grey, having but few spots (of the form × ×× and purplish black) above the lateral line and scarcely any below it. Donovan's Sewen (pl. 91.), with which they are evidently identical, is a very characteristic figure. These specimens differ only from it in having fewer spots below the lateral line—but in this particular they accord not with each other—and in the darkness of the blue he represents, being relieved or lightened by a silvery cast†. The tail of the sewen cannot be called incorrect from being forked, as when unexpanded it appears slightly so in the present specimens, although when fully spread out it is square. The female exhibits over the body and operculum, &c. as many more spots as the males—on her operculum are six round spots, on that of the males two or three. Fins of the female coloured as in the sewen, but in the males all darker; V. and A. dull pink or flesh colour in the female; in the males the V. grey for two thirds posteriorly, the A. entirely dark grey; their other fins merely of a darker shade than those of the female. Irides silvery.

The ova in the female are very minute, being not more than half the size of clover seed; the milt in the males occupies twice its space. These latter not having any of the red markings said to distinguish the adult male, and the hook of the

* In the 'Fauna Boreali Americana' it is remarked, that "the hook of the under jaw is very decided, even in a young *Salmo Cambricus*," (Part 3. p. 307,) but in the present instance the reverse appears.

† This observation is perhaps superfluous, as different copies of the work may not invariably exhibit the same shade of colours.

lower jaw being so slightly developed, taken in connection with the internal appearance of both sexes, lead to the conclusion that they would not have bred for another year. In the stomach of one was a sand eel (*Ammodytes Lancea*) three inches long, and in another a large piece of the marine plant (*Ceramium rubrum*).

GADUS CALLARIAS, Linn. Dorse.—An examination of the fishes before mentioned as taken on the coast of Cork and forwarded for my inspection by Mr. R. Ball, enables me to restore this species with certainty to the place it once held in the British Fauna. Two small specimens thus received are in length respectively $3\frac{1}{2}$ and 6 inches; in the latter the number of fin rays are D. 14, 18, 18; A. 20, 17; P. 18; V. 6; C. 24.—Br. 7. In both individuals the 1st and 2nd rays of the ventral fin are produced in slender filaments, of which the second is the longer; eyes invested with a membrane as in *G. luscus*, &c.; head to entire length as 1 to 3 in the larger, as 1 to $3\frac{1}{2}$ in the smaller specimen; no pores visible about the mouth as in *G. minutus*. In other characters these individuals agree with the *G. Callarias* as described by Bloch and Nillson. They were taken in sprat nets at Youghal in the autumn of 1834, when a third specimen also occurred.

Subsequently I had the satisfaction of recognising a *G. Callarias* among some native fishes presented by Mr. Wm. Marshall (Memb. Nat. Hist. Society) to the Belfast Museum without regard to species. Upon inquiry, I learned from this gentleman that it had been captured by himself when fishing in the month of June or July about the entrance to Larne Lough, county of Antrim, and using the lug worm (*Lumbricus marinus*) for bait. Its length is 8 inches. We thus find that the species occurs both on the northern and southern shores of Ireland.

GADUS MINUTUS, Linn. Poor.—Amongst some fishes taken in a trawl net by Mr. Hyndman in Belfast Bay in the month of September 1835, and kindly preserved for me, are three individuals of this species, which as British has hitherto been known only to the southern coast of England. These specimens are under four inches in length; their fin rays about the number described by Mr. Jenyns, but it may be observed that

in the 1st and 2nd D. fins the second ray is longest, in the 3rd D. fin, the third, fourth, and fifth rays are longest, and of about equal length: in the 1st A. fin the rays gradually increase in length posteriorly to the seventh, which, with the eighth and ninth, are of about equal length. Tail slightly forked, just as represented in both editions of Pennant's British Zoology.

Feb. 19, 1836. In Belfast market I obtained a *G. minutus* which was taken along with a quantity of atherines (*A. Presbyter*) in Strangford Lough. Its length is six inches; the exact number of fin-rays are, D. 13, 24, 20; A. 27, 22; P. 14; V. 6; C. 20 (with many side rays).

Lateral line curved anteriorly for very nearly half its length, remainder straight. Colour just as described by Bloch; above the lateral line pale yellowish brown, marked with extremely minute black dots, below it silvery minutely dotted with black, which latter marking prevails in the pectoral and anal fins; irides silvery; tinged with black above.

In the same jar with the last-mentioned *Gadus Callarias* were three specimens of *G. minutus*, which I learned from Mr. Marshall were taken at the same time and place with it, and with the same bait. The largest is $8\frac{3}{4}$ inches long, diameter of its eye $8\frac{1}{2}$ lines. Jan. 12, 1838. I received a *G. minutus* 8 inches in length from Killough, on the coast of Down. Among fishes from Youghal, submitted to my examination by Mr. R. Ball, in July 1837, were two individuals of this species, one $8\frac{3}{4}$ the other $10\frac{1}{2}$ inches in length.

The figures of *G. Callarias* and *G. minutus* in Mr. Yarrell's 'British Fishes' are very characteristic; the curve of the lateral line, however, approaches the tail more nearly in my specimens of the latter than is represented in the figure—in all of them about one half of this line is curved.

[To be continued.]

XXXIX.—On the RHIZOPHOREÆ. By G. A. WALKER
ARNOTT, Esq., LL.D., F.L.S., R.S.E.

THE genus *Rhizophora*, as left by Linnæus and adopted by De Candolle, ought to be rather considered a group of the

order *Rhizophoreæ*, and to contain several distinct forms. The group or sub-order may be defined as follows :

Calyx 4—12-fidus, persistens : æstivatio valvata. Petala sessilia 4—14, calyci inserta ac ejus lobis alternantia. Stamina 8 vel plura, ibidem inserta : filamenta discreta : antheræ biloculares, longitudinaliter intus dehiscentes. Discus carnosus inter ovarium et calycem, quandoque inter ovarium et stamina in anulum brevem dentatum productus. Ovarium plus minusve cohærens, 2—4 loculare, loculis biovulatis, rarius dissepimentis obsoletis uniloculare 6-ovulatum : ovula ad apicem axis centralis suspensæ. Stylus unicus. Stigma 2—1-dentatum vel simpliciusculum. Fructus coriaceus, unilocularis, monospermus, ad apicem, inchoante germinatione, embryonis radícula et tigello in clavam longissimam productis perforatus. Semen pendulum. Albumen nullum. Cotyledones planæ. Radícula supera — Arbores maritimæ omnino fere tropicæ, ramis oppositis. Folia simplicia, opposita, integerrima, coriacea, glabra. Stipulæ interpetiolares, convolutæ, caducæ. Pedunculi axillares.

To the above De Candolle adds that the petals are furnished with *two* bristles or awns at the apex. In the particular species he had examined there are *three* bristles, but in several others there are none whatever. His description of the stamens and ovary is likewise too limited, and consequently inapplicable to several species.

In the 'Encyclopédie Méthodique' and 'Illustrations des Genres,' Lamarck separated from the true species of *Rhizophora* the *R. gymnorrhiza* under the name of *Bruguiera*. This new genus was adopted in 1834, in the Prodr. Flor. Penins. Ind. Or. i. p. 311, by Dr. Wight and myself, with a character in some respects too enlarged, and in others too restricted, although suitable to the species we had then in view ; but a few years previous (in 1827), Blume had also adopted it in his 'Enumeratio Plant. Javæ,'—a work with which we were then unacquainted. Blume's generic character of *Bruguiera*, applicable to the species from Java and the Moluccas, differs in several points from what we proposed, and it becomes therefore necessary to extend both a little, in order to contain all the species.

Dr. Wight, in the course of some excursions he made to the salt marshes in the neighbourhood of Quilon in December 1835 and June 1836, was so fortunate as to collect not only all the former species we described in the Prodrômus,

but one or two additional, specimens of all of which I have since received from him. I shall therefore here endeavour to give a synopsis of the genera and species of the whole group.

I. RHIZOPHORA, Lam., Kunth, Blume, W. & A.

Calyx 4-fidus; laciniae tubo 2—3-plo longiores. *Petala* 4 lanceolata acuminata apice nuda. *Stamina* 8—11, quorum 4 petalis opposita. filamenta brevissima: antherae magnae, subsessiles, basi affixae, conniventes, oblongo-lineares, acuminatae, breviter cuspidatae. *Ovarium* semiadhærens, biloculare, 1-ovulatum, parte libera ovata carnosum solidum, sensim in *stylum* conicum brevem acuminatum. *Fructus* subovatus, basi calycis laciniis recurvis coronatus, tubo longior.

Pedunculi 2—3-fidi vel dichotomi; calyx bractea cupulata suffultus. Flores magni: alabastra ovoidea, lœvia.

§ 1. *Stamina* 8. *Petala* concava, coriacea, stamen unicum antepositum foventia, versus margines induplicatos villosa. *Pedunculi* ex axillis foliorum homotinorum orti, petiolis sublongiores, 2—3-fidi vel dichotomi. flores plus minusve pedicellati.

1. *R. Mangle* (Linn.); foliis obovato-oblongis, obtusis. — α , pedunculis 2—3-floris, floribus sublonge pedicellatis, calycis laciniis triangulari-oblongis.—*R. Mangle*, Linn. *Sp. P.* 634 (ex parte); *DC. Prod. III. p.* 32; *Felloz. Fl. Plum. v. t. 1.* — β ? pedunculis dichotomis.—*R. racemosa*, Meyer *prim. Esseq. p.* 185. *DC. l. c.*

Hab. in America, et ! Africae oris occidentalibus.

I refer to the African locality with great doubt, not having myself seen any specimens from that country. Brown, in his appendix to Capt. Tuckey's narrative of the expedition to the river Congo, at p. 437, says: "Of *Rhizophoreæ*, as I have formerly proposed to limit it, namely to *Rhizophora*, *Bruguiera*, and *Carallia*, the collection contains only one plant, which is a species of *Rhizophora*, the mangrove of the lower part of the river, and probably of the whole line of coast, but *very different* both from *that* of America, and from those either of India or of other equinoctial countries that have been described." From which we learn two things, that Dr. Brown considers that there is only one American species; and secondly, that the west African one is perfectly distinct from it. On the other hand, Guillemain and Perottet say of the African plant (*Fl. Senegamb. i. p.* 291): "C'est bien la même espèce que celle qui croit si abondamment aux Antilles, au Mexique, à la Louisiane, et au Brésil." It is to be regretted that neither of these botanists have given a complete descrip-

tion from African specimens. Guillemin and Perottet quote De Candolle's specific character, "pedunculis 2—3-floris, petiolo longioribus," whence it appears to coincide in these respects with the more common American form. From the great general affinity, however, between the Senegambian plants and those of East India, I would rather have supposed the mangrove of the west of Africa to be allied to the next species, but the leaves are said to be obtuse.

2. *R. mucronata*, Lam.; foliis ovalibus longe cuspidatis, calycis laciniis triangulari ovatis.—*R. mucronata*, Lam. *Enc. Méth.* vi. p. 169; *ill. tab.* 396. *fig.* 2. *DC. l. c.*; *Decaisne in Ann. Sc. Nat. n. s.* iv. p. 75.—*R. Mangle*, Lin.? (ex parte). *Roxb. Fl. Ind.* ii. p. 459. *Blum. en. Pl. Jav.* i. p. 91, (excl. syn.).—*R. candelaria*, Wall. *Cat. n.* 4878. *Wight, et Arn. Prod. Fl. Penins. I. O.* i. p. 310, (non *DC.*). *Wight. Cat. n.* 1041. *Hab.* in insulis Mauritio, Madagascar, Ceylano, et Java, in Arabia Felice prope Yemen (*Bové*, n. 230), Malabar, ad ostia Gangis, ac verosimiliter in aliis multis Indiæ orientalis maritimis.

When the inflorescence is more divided, the pedicels are conspicuous; when reduced to three or five flowers, they are usually very short. The specimens described by Roxburgh, and those sent me from Quilon, belong to the latter form; those from some other parts of the peninsula have the peduncles as much and as loosely divided as in Lamarck's figure of the Mauritius plant. I have not seen a sufficient number of both to enable me to ascertain if they be distinct varieties, or if this difference be only accidental; the pedicels, although evident, are usually shorter and thicker than those of *R. Mangle*.

This species takes the place of *R. Mangle* in India, and is principally distinguished from it by the curious bristly point of the leaves, formed not by the mere excurrent portion of the midrib, but by a sudden contraction of the leaf itself. I consider Lamarck's plant to be the same as the Indian one, notwithstanding that Lamarck does not describe the petals, for what Poiret seems to take for them are the calyx-segments: in the 'Illust. des Genres', the whole figures are not explained; and it is not improbable, that what is represented at letter *g* are the petals incorrectly split to the base, but showing their ciliated margins. The Indian species does grow in the Mauritius, which confirms this supposition; and I have seen none but it from that island.

Blume does not notice the woolly margin of the petals, and the description in his generic character is applicable almost solely to the next species. Wallich may have both in view in his list of East Indian plants under No. 4878; but what I have seen of that number belong exclusively to the present species.

§ 2. Stamina nunc 8, sæpius 11—12. Petala plana, submembranacea, glaberrima. Pedunculi petiolo multo breviores, ex axillis foliorum antinorum orti, crassi, apice sub-biflori: flores sessiles.

3. *R. conjugata* (Linn.); foliis oblongis subacuminatis longe cuspidatis. *Lin. Sp. p.* 634; *Fl. Ceyl. n.* 181; *DC. l. c. p.* 33; *Wight. Cat. n.* 2449. *Roxb. Hort. Beng. p.* 36 (in fl. Indica omissa).—*R. Candelaria* DC. l. c.—*R. apiculata* Blum. *en. Pl. Jav. i. p.* 91.—*Rheed. H. Mal. vi. tab.* 34. *Rumph. Amb. iii. t.* 71 et 72.

Hab. in insulis Ceylano et Java. In Malabaria prope Cochin, &c. *Rheede, Quilon; Wight.*

Blume has referred the synonym of Rumph to his *R. Mangle*, but the peduncles are represented as extremely short, and the petals appear to be glabrous, if these be what is meant by “staminibus quatuor aliis longioribus et incurvis supra florem elevatis;” but probably Rumph had both species in view, as he says that the flowers are sometimes bigeminate, which has more reference to *R. mucronata*. Rheede’s figure is a good representation of *R. conjugata*, nor are the narrow glabrous petals omitted by the artist; but the description of the flower, “petalis lanuginosis hirsutisque,” is taken from the few-flowered short-pedicelled form of *R. mucronata*.

II. CERIOPS, Arn.

Calyx 5-fidus; laciniae tubo 2—3-plo longiores. *Petala* 5, ovalia, emarginata, apice setigera, plana, ante anthesin stamina duo amplectentia. *Stamina* 10, erecta; filamenta petalis subdimidio breviora: antheræ cordato-ovatae, obtusæ, filamentis multo breviores, dorso paullo supra basin affixæ. *Ovarium* semiadhærens, tri- (in una specie, forsan in omnibus) loculare, 6-ovulatum, parte libera ovata carnosum solidum apice in stylum stamina superantem desinens. *Stigma* simpliciusculum. *Fructus* subovatus, prope basin laciniis calycinis patenti-recurvis coronatus, tubo longior.

Pedunculi petiolum subæquantes, cymum densiflorum subcapitatum ferentes.

Calyx bractea cupulata suffultus. Flores parvi, vix pisi magnitudine: alabastra subovoidæ. Valde a Rhizophora differt hocce genus habitu,

inflorescentia, floribus pentameris, petalis, staminibus, stigmatibus, et (an semper?) ovario.

1. *C. Candolliana* (Arn.); foliis obovalibus vel obovatis obtusissimis petalis margine glabris apice trisetis, setis clavatis. *Wight. Cat. n. 2150*. —*Rhizophora Timoriensis* DC.? *Prod. iii. p. 32*; *Decaisne? Herb. Timor. p. 124*—*Bruguiera Arnottiana* *Wight. in Litt.*

Hab. in oris Malabaricis prope Quilon; *Wight, 1836*. In insula Timor (fide *De Cand. et Decaisn.*). "Careening bay" in Nova Hollandia; *Cunningham (in Herb. Hook.)*.

DeCandolle describes this with only two bristles at the apex of the petals; but in all the species of *Rhizophoreæ* which have terminal bristles I have uniformly found one in the fissure, in addition to those on the lobes. Decaisne, indeed, mentions that there are three bristles, and moreover gives a detailed description, agreeing in almost every particular with Dr. Wight's specimens and those from New Holland; the only difference is in the ovary, which Decaisne says is "uniloculare (ante anthesin)," whereas in those I have examined, both previous to flowering and shortly after fecundation, it is when uninjured certainly trilocular. Although I feel almost certain about the identity of DeCandolle's plant with mine, I have preferred changing the specific name of *Timoriensis* to one in honour of the original describer, partly on account of the alleged difference of structure of the ovary, and partly from the extensive geographical distribution the plant enjoys.

2. *C. Roxburghiana* (Arn.) foliis obovalibus obovatisve obtusissimis, petalis inferne glabris versus apicem setoso-ciliatis, setis (sub 7) validis. —*Rhizophora decandra* *Roxb. Hort. Beng. p. 36*; in *cat. Merr. Ind. Mus. tab. 1140* (in flor. Ind. omitta); *Wall. Cat. n. 4875*; *Herb. Ham. n. 1109*.

Hab. Ad ostia Gangis; *Goodlad*; *Hamilton*. Penang, Martaban, Tavoy, &c. (fide *Wallich*.)

In the copy which I have seen of Roxburgh's drawing referred to above, the petals appear ciliated with scattered longish hairs or bristles round the whole margin; but this is probably a mistake, for in the specimens I have examined of *Wall. Cat. n. 4875 a*, and which were collected by *Hamilton* in the locality from which Roxburgh obtained his, the petals are only furnished towards the apex with about three stout

bristles of equal thickness on each side, giving to them a palmate appearance; indeed the bristles resemble in miniature the fingers of a person's hand, the hand itself being represented by the petals. In *C. Candolliana* there are never more than three bristles, which are much thickened at the apex, and taper towards the base.

Of Dr. Wallich's n. 4875, I have also seen (in Herb. Hook.) the letter *b* from Penang; but it is without flower or fruit. It is probable that several species of the genus remain to be described, and on that account I have given a fuller specific character to both the above than was otherwise necessary.

III. KANDELIA, W. & A.

Calyx 5-fidus; laciniae tubo 3—4-plo longiores, lineares, patentes. *Petala* 5, membranacea, glabra, basi linearia subcanaliculata, ultra medium bifida, lacinii in fila plurima capillaria longa inaequaliter fissis. *Stamina* petalorum numero 6—8-pla: filamenta subulato-capillaria, calycis lacinias fere aequantia: antherae oblongae, parvae, obtusae, dorso paullo supra basin affixae. *Ovarium* adhærens, 1-loculare, 6 ovulatum. *Stylus* filiformis, staminum subsuperans. *Stigma* 3-dentatum. *Fructus* oblongus, basi lacinii calycis patentibus coronatus, tubo multo longior.

Arbor parva. Folia anguste elliptico-oblonga, obtusa. Pedunculi petiolo longiores, 2—3-chotomi, 4—9-flori. Flores majusculi, nunc rarius 6-meri: alabastra prismatica. Calyx bractea cupulata suffultus. Embryonis germinantis tigellus clarato-subulatus, acutissimus.

1. *K. Rheedei*, W. & A., l. c.; *Wight. Cat.* n. 1012.—*Rhizophora Candel*, Linn. sp. p. 631. DC l. c.; *Wall. Cat.* n. 1876. *Roxb. Hort. Beng.* p. 36 (in fl. Indica omitta); *Herb. Ham.* n. 1110.

Hab. ad oras Malabaricas præsertim australiores. *Rheede, Klein, Wight.* Ad ostia Gangis. *Hamilton.*

IV. BRUGUIERIA, L'Her., Lam., Brown, Blume, W. & A.

Calyx 8—14-fidus: laciniae tubum turbinatum subæquantes. *Petala* oblonga, bifida, basi circa stamina duo anteposita arcte conduplicata vel convoluta. *Stamina* petalorum numero dupla, biserialia, e petalis tandem elastice dissilientia: filamenta petalis subdimidio breviora, inaequalia interioribus brevioribus: antherae lineares vel oblongae, acutae, basi affixae. *Ovarium* adhærens, 2—3—4-loculare, loculis 2-ovulatis. *Stylus* filiformis, staminum longitudine: stigma 2—3—4-dentatum. *Fructus* turbinatus, tubum calycis haud superans ac ejus lacinii apice coronatus.

Pedunculi 1—3 vel pluriflori. Calyx basi nudus: alabastra fusiformia vel ovoidea.

§ 1. *Petala apice nuda.*

Of this section I have not seen any specimens, and have therefore taken the specific characters from Blume.

1. *B. gymnorrhiza* (Blume), "foliis ovalibus acutis, petalorum laciniis apice nudis, fructibus" (seu tigellis) "cylindraceo-acutiusculis costatis." *Blume en. Pl. Jav.* i. p. 92 (non Lam., nisi quod ad fructum a Gärtnero mutuatum).—*Rhizophora gymnorrhiza*, *Lin. sp.* p. 634 (ex parte). *Gärtn. fr. t.* 45.—*Mangium celsum*, *Rumph. Amb.* iii. p. 102. t. 68.

Hab. in Java atque Moluccis.

It is impossible to determine what species Linnæus had most in view, as he quotes both the figures of Rumphius and Rheede's *H. Mal.* vi. t. 31 and 32. From, however, its having been ascertained that he possessed a copy of Rumphius and not of the other, but derived his information respecting the latter from Ray's *Historia Plantarum*; and as Rumph's description of the naked roots, as well as Rheede's, may have given rise to the specific name, I gladly follow Blume in considering the present as the type of the Linnæan plant. Several, if not all the species of the genus, but particularly *B. Rheedei*, exhibit a similar structure in the lower part of the stem; so that upon the whole it would be preferable to adopt the name of *B. celsa*, especially as Lamarck, who first described the genus *Bruguiera*, and gave the name *B. gymnorrhiza*, did so from the Malabar plant. Lamarck, however, confounded as varieties several distinct species.

Unfortunately Blume's descriptions of this and the following are not sufficiently explicit to enable me to compare the species with those I have myself examined; but Rumph describes or figures in the present one ten calyx segments erect in fruit, ten petals glabrous on the margin, and one-flowered peduncles. Gärtner says that there are 12—14 incurved calyx segments; Blume, however, does not refer to Gärtner.

2. *B. cylindrica* (Blume), "foliis oblongis acuminatis, petalorum laciniis apice nudis, fructibus" (seu tigellis) "cylindraceis obtusis lævibus." *Blume, l. c.* p. 91 (excl. syn. Rheede).—*Rhizophora cylindrica*, *Lin. sp.* p. 635 (ex parte).—*Mangium digitatum*, *Rumph. Amb.* iii. tab. 70. *Hab.* in Moluccis et Java, &c.

If it were difficult to fix the Linnæan synonyms of the last, it is more so of this; for while on the one hand Linnæus only saw Rumph's figure, on the other, in the '*Species Plantarum*,'

he only quotes Malabar as its native country. As, however, Blume first limited the species, I have allowed the name to remain with the *Molucca* plant. Blume quotes Rheedé's *H. Mal.* vi. t. 33, as well as Rumph's figures, from which I presume that this species ought to be compared with *B. malabarica*.

In Rumph's work there are some discrepancies between the description and figure; thus it is said that the calyx has 8—10 or 11 patent segments that are finally reflexed, while in the figure there are at least 10 segments erect, even when in fruit. The tigellus is said to be neither angled nor striated, but is represented in the figure slightly furrowed. The peduncles, according to both figure and description, are one-flowered, which circumstance would seem to remove it from *B. malabarica* and its allies.

§ 2. *Petala apice setigera*.

- * Calycis laciniae 9—14, lineari-acuminatae, apicem versus triquetrae, fructiferæ suberectæ. Antheræ lineares. Ovarium 3- (nunc 4-) loculare. Pedunculi uniflori, cernui, folio breviores. Flores magni.

3. *B. Rheedei* (Blume?) foliis ovali-oblongis utrinque acuminatis, calyce 10—14- (scæpius 12-) fido laciniiis demum erectis vel subincurvis, petalis ima basi villosulis alioquin glaberrimis laciniiis acutis apice bisetis cum seta quinta in fissura. Blume? *l. c.* p. 92.—*B. gymnorrhiza*, Lam. (quoad flores) *ill. t.* 397. *f. a, b, c*, et forsân *d*—*f. Herb. Ham. n.* 1111. *Wight et Arn. l. c.* p. 311 (ex parte); *Wight, Cat. n.* 1043 (ex parte).—*Rhizophora gymnorrhiza* Lin. *sp. p.* 634 (ex parte). *Roxb. Fl. Ind. ii. p.* 460; in *cæt. Merc. l. O. Mus. tab.* 1246. *Wall. Cat. n.* 4874. *Lour. ! Coch. (ed. Willd.) p.* 364.—*Rheed. H. Mal. vi. t.* 31 et 32. *Rumph. Amb. t.* 69 (fide Blume; itaque huc trahenda *R. Palun, DC. l. c.*)

Hab. in Malabar, *Rheedé, Wight*. Ad ostia Gangis, *Goodlad, Hamilton*. In Moluccis ac Java (fide *Blumei*). *Cochinchina, Loureiro*. In Penang, &c., *Wallich*.

Tigellus subcylindricus, lævis, utrinque acuminatus, in hac, et forsân in aliis hujus subsectionis speciebus.

I feel uncertain if this be Blume's plant, on account of his reference to Rumph's *Hortus Amboinensis*: according to that work the peduncles are usually two-flowered, the calyx segments 5 in the description, or as many as 8 or 10 in the miserable accompanying figure, and the germinating radicle or tigellus cylindrical and striated, which is not the case with the Malabar species.

In the Prodr. Fl. Penins., Dr. Wight and I have blended together two species, on the supposition that the two or three imperfect flowers we had of the present one presented glabrous petals only by the accidental abrasion of the marginal hairs found in the other. A careful comparison, however, of Rheede's figure and Roxburgh's excellent description, with specimens of both sent me lately by Dr. Wight, induce me now to separate the two. It is probable that Wallich's Cat., n. 4784, contains more than one species. The plant from Penang (*f*) I have seen in Dr. Hooker's Herbarium, but without either flower or fruit; it may be *B. gymnorrhiza* of Blume.

4. *B. Australis* (Cunn.); foliis ovali-oblongis utrinque acuminatis, calyce 9—10-fido, petalis basi lanatis secus margines pilosis laciniis linearibus obtusiusculis versus apicem sub-4-setis cum nona longiuscula in fissura.

Hab. ad "Moreton bay" Novæ Hollandiæ, *A. Cunningham* (in Herb. Hook).

5. *B. eriopetala* (W. & A.); foliis ovali-oblongis utrinque acuminatis, calyce sub 10-fido, petalis a basi ad apicem versus margines dense argenteo-hirsutis laciniis obtusiusculis prope apicem unisetis cum seta tertia longiuscula in fissura. *Wight. Cat.* n. 2451.—*B. gymnorrhiza*, *W. et A. l. c.* (ex parte); *Wight. Cat.* n. 1043 (ex parte).

Hab. ad Quilon, *Wight*.

This and the two preceding have the same habit, and are scarcely to be distinguished except by an examination of the petals: in the present species I find constantly ten calycine segments, in *B. Australis* nine or ten, and twelve in *B. Rheedei*, but these may be subject to a slight variation.

- Calycis lacinia 8, oblongo-lineares, planiusculæ, fructiferæ patentés. Petala ad margines parce villosula, laciniis apicē 3—4-setis cum seta unica in fissura. Antheræ lineari-oblongæ. Ovarium 2—3-loculare. Pedunculi pluriflori. Tigellus germinans subcylindricus, læviusculus.

6. *B. caryophylloides* (Blume) foliis ovalibus utrinque acutis, pedunculis petiolo brevioribus 3- (nunc dichotome 5-) floris, calycis laciniis acutis, ovario biloculare, tigello subclavato acutiusculo. *Blume, l. c. p.* 93.—*Rhizophora caryophylloides*, *Burm. Ind. p.* 109. *Jack, in Mal. Misc. i. p.* 34; in *Hook. Bot. Misc. ii. p.* 80; *Wall. Cat. n.* 4879.—*Rumph. Amb. iii. tab.* 78.

Hab. in Singapore et Pulo-Penang, *Jack*. Circa Bataviam, *Blume*. In Moluëcis, *Rumph.*

This I have not seen. Jack describes its ovary as two-

celled, while Blume attributes to the whole genus a three-celled ovarium.

7. *B. malabarica* (Arn.); foliis elliptico-oblongis utrinque acuminatis, pedunculis petiolum æquantibus apice trifloris, floribus arcte sessilibus, calycis laciniis obtusiusculis, ovario biloculari, tigello cylindrico demum supra medium paullo attenuato obtuso. *Wight. Cat. n.* 2152.—*Rhizophora cylindrica*, *Lin. sp. p.* 635 (ex parte). *Rheed. Mal. vi. t.* 33.

Hab. ad oras Malabariæ, *Rheede, Wight.*

Both this and the preceding have the germinating tigellus tapering slightly and obscurely angled towards the point. I as yet know of no character to separate the two except the narrower and more pointed leaves, and longer peduncles of the Malabar plant. I have never, in the present one, observed more or less than three flowers on each peduncle, but the two lateral ones often drop off before expansion.

8. *B. parviflora* (Arn.); foliis elliptico-oblongis seu lato-lanceolatis, pedunculis semel bisve trichotomis multifloris, ovario 3-loculari, tigello subcylindrico, *Roxb.*—*Rhizophora parviflora*, *Roxb. Fl. Ind. ii. p.* 461.—*R. cylindrica* *Roxb. Hort. Beng. p.* 36. *Wall. Cat. n.* 4877.

Hab. Ad ostia Gangis.

My character of this is taken from Roxburgh, the only specimen so named, which I have seen, being from Penang (*Wall. Cat.* 4877. c.) and having neither flower nor fruit; its leaves are slightly acuminate at both ends, so that the species may be *R. cylindrica* of Blume.

If the number of cells of the ovary and flowers on the peduncle be liable to variation, the three species of this subsection may be combined, unless some of them be found to have the flowers pedicellate, respecting which Jack, Blume, and Roxburgh are silent.

§. *Vix nota.*

9. *B. sexangula* (Spr.); foliis ovato-lanceolatis, pedunculis unifloris, calyce 10-fido magno laciniis acutis patentibus, petalis ciliatis, tigello prismatico æqualiter hexagono obtuso.—*Rhizophora sexangula*, *Lour. Coch. (ed. Willd.) p.* 363.

Hab. In Cochinchina, *Loureiro.*

This obviously approaches very closely to *B. Australis*, and by the tigellus to *B. gymnorrhiza*, Bl., but from the imperfect description of the petals, it is uncertain whether it be a form of either, or a distinct species. Loureiro adds, "filamenta 20, *Ann. Nat. Hist. Vol.* 1. No. 5. July 1838. 2 B

capillaria, calyci insistentia, ipso longiora, antheris oblongis stantibus," which does not agree with *B. Australis* or its allies.

The following is a *Clavis Analytica* of the better known species.

Fructus semiadhærens.

Petala 4 I. *Rhizophora*, L.

Petala 5.

Stamina 10..... II. *Ceriops*, Arn.

Stamina indefinita..... III. *Kandelia*, W. & A.

Fructus omnino adhærens IV. *Bruguiera*, L'Her.

I. Petala margine villosa.

Folia obtusa *R. Mangle*, L.

Folia apiculata *R. mucronata*, Lam.

Petala glaberrima *R. conjugata*, L.

II. Petala apice trisetata *C. Candolliana*, Arn.

Petala versus apicem setoso-ciliata *C. Roxburghii*, Arn.

III. (Unica species) *K. Rheedei*, W. & A.

IV. Petala apice nuda.

Tigelli costati *B. gymnorrhiza*, Bl.

Tigelli læves *B. cylindrica*, Bl.

Petala apice setigera.

Calycis laciniae 9—14 fructiferæ erectiusculæ.

Petala (salva basi) glaberrima *B. Rheedei*, Bl.

Petala basi lanata secus margines pilosa *B. Australis*, Cunn.

Petala secus margines sericeo-hirsutissima ... *B. eriopetala*, W. & A.

Calycis laciniae 8, fructiferæ patentēs.

Pedunculi sub-3-flori; ovarium 2-loculare.

Folia utrinque acuta; pedunculi petiolo }
breviores..... } *B. caryophylloides*, Bl.

Folia utrinque acuminata; pedunculi pet. }
æquantēs } *B. malabarica*, Arn.

Pedunculi multiflora; ovarium 3-loculare... *B. parviflora*, Arn.

From the order *Rhizophoreæ* must be excluded *Olisbea rhizophoræfolia*, DC., which is the same with *Guildingia psidioides*, Hook. in Bot. Misc. i. p. 122. t. 30. Steudel in his 'Nomenclator Botanicus,' (a work I have not seen,) has, I believe, enumerated, without description or synonyms, a *Rhizophora ceratophylloides*; if the specific name be well founded it can scarcely belong to this tribe of plants, but it may more probably be a mere typographical error for *R. caryophylloides*.

Carallia (from which *Baraldeia*, Pet. Th., *Diatoma*, Lour., and *Petalotoma*, DC. are not distinct) is readily distinguished from the Linnæan genus *Rhizophora* by the unguiculate petals, and from nearly all the genera into which I have divided that

genus by the one-celled ovarium, agreeing in that respect with *Kandelia* only, but in other points differing widely. To this genus (*Carallia*) I have in the Nova Act. Ac. Nat. Cur., xviii. p. 334. added two species, one which appears to be the *Diatoma brachyiata* of Lourcero, the other from Ceylon. This last I have also received lately from Dr. Wight, collected at Quilon on the Malabar coast, accompanied with specimens, procured at the same place, of another form which Dr. Wight considers perfectly distinct and has named *C. corymbosa*: this is almost intermediate between the Chinese and Ceylon plants, if indeed the three be not varieties of one species. They all have leaves with recurved margins, which although sometimes obscurely crenulate or serrulate towards the point, may, in comparison with Roxburgh's species, be said to be quite entire; about seven orbicular slightly retuse but apiculate petals, broader than long, and cut and curled on the margin; a stigma of usually four, but occasionally five or seven emarginate lobes, and the teeth of the calyx are about equal in length to the petals; they may be distinguished from each other as follows:

1. *C. Ceylanica*, (Arn.); foliis cuneato-obovatis obtusissimis subretusis latitudine subdimidio-longioribus.—*Arn. l. c.*; *Wight. Cat. n. 2446* — *C. obcordata*, *Wight. in litt.*
2. *C. corymbosa* (Wight); foliis oblongo-obovalibus obtusis vel obsolete ac obtuse acuminatis latitudine 2—2½-plo longioribus.—*Wight. Cat. n. 2447.*—*Rheed. II. Mal. v. t. 13.* (inflorescentia ac floribus pessime delineatis.)
3. *C. Sinensis* (Arn.); foliis cuneato-obovatis breviter ac obtuse acuminatis latitudine subduplo longioribus.—*Arn. l. c.* (cum syn.)

These obviously differ very slightly: in *C. Ceylanica* and *C. Sinensis* the leaves are decidedly cuneate at the base, the margin presenting a rather concave curve; in *C. corymbosa* the cuneiform appearance is less evident from the curvilinear margin being usually slightly convex. What *C. integerrima*, DC. is, or from what part of India it was obtained, I have not ascertained; if distinct from all the above, it may be thus defined:

4. *C. integerrima* (DeC.); foliis ovalibus subacuminatis latitudine duplo longioribus.

C. Baraldeia, W. & A. (*Baraldeia Madagascariensis*, Pet. Th.) has slightly serrated leaves, and according to the author's de-

scription constantly five petals and ten stamens; whereas in the Indian species I believe there are never fewer than six petals.

Dr. Brown has pointed out the affinity of *Cassipourea*, Aubl. or *Legnotis* of Swartz with this order, although allied at the same time to *Salicariæ*. Of that genus I do not possess any species, nor have I had an opportunity of examining them minutely; but according to authors the stigma is entire, and the number of stamens three or four times as many as the petals: in other respects however I have a plant not much at variance from Prince of Wales Island, and this agrees so well in appearance with *Microtropis coriacea*, Wall. Cat. n. 4338 (of which I have not seen the flower) as probably to be the same. This species has the stigma of *Carallia*, and stamens only twice as many as the petals, and is thus still more allied to *Carallia* and the true *Rhizophoræ* than *Cassipourea*, but forming a link between them: like *Cassipourea*, the ovary is free and composed of several cells with more than two ovules in each; as in the *Rhizophoræ* with an inferior ovary there is a perigynous disc between the ovary and the petals, the stamens being attached to the outside (or underside) of this disc. *Cassipourea* and the Penang plant have both fleshy albumen; in the former the cotyledons are said to be flat, in the latter they are certainly semiterete. From these considerations I am induced to propose it as a new genus, as follows:

DRYPTOPETALUM.

Calyx 4—5-partitus: laciniae ovatae: aestivatio valvata. *Petala* 4—5, decidua, calycis laciniiis subbreviora ac alterna, late cuneata, subunguiculata, apice longe fimbriato-lacera, aestivatione involuta. *Discus* perigynus 8—10-crenatus circa ovarii basin. *Stamina* 8—10, sub margine disci libero inserta, 4—5 petalis opposita, totidem alterna: *filamenta* subulato-filiformia, apice aestivatione incurva: *antheræ* globosæ, dorso affixæ, biloculares, intus dehiscentes. *Ovarium* liberum, ovato-globosum, 5-sulcatum, carnosum, 5-loculare (nunc loculo uno subabortivo); loculis 4-ovulatis. *Stylus* filiformis, brevis. *Stigma* peltatum, 5-partitum; laciniiis stellato-recurvis, linearibus, apice emarginatis. *Fructus* pisiformis, baccatus, intus pulposus, sub-5-locularis, 8—10-spermus. *Semina* oblonga, apice contracta, appensa; testa rugulosa, crustacea. *Embryo* albus, teres, in axi albuminis carnosi albi: *radicula* supera, cotyledonibus semiteretibus paullo longior.

Frutex vel arbor glabra. Folia opposita, coriacea, penninervia, venosa, ob-

longo-ovalia, breviter acuminata, subintegerrima supra medium denticulis paucis obsoletis, 4—5 poll. longa, 2—2½ lata, basi in petiolum vix semipollicarem subattenuata. Flores axillares, fasciculati, pedicellati, pedicellis petiolo brevioribus, medio articulatis.

1. *D. coriaceum*, Arn.—*Microtropis coriacea*, Wall.?

Hab. In Pulo-Penang.

I have seen no stipules, but there are scars between the petioles as in *Rhizophoreæ* after the stipules have fallen off. The ovarium and stigma seem to be always in a quinary proportion, even when the flowers are tetramerous; but then two of the divisions of the stigma are more approximated than the others, and one of the cells of the ovary appears to be imperfect.

Martius in his observations on Indian plants in the 'Algemeine Zeitung' for January 1834, and 'Ann. des Sc. Nat.' n. s. i. p. 250, mentions that there are eleven species of *Rhizophoreæ* in East India according to Wallich's list: there are however only eight noticed by Dr. Wallich, but this number may be made up of the three species of *Carallia* described in De Candolle's Prodrômus, of *Rhizophora conjugata*, *gymnorrhiza* and *cylindrica* of Linnæus; *R. caryophylloides*, Jack; *R. Candel* and *Candelaria* of De Candolle, with *R. parviflora* and *decandra* of Roxburgh mentioned in Wallich's list. While one of these has been unnecessarily split down, others, very distinct, appear to be confused under the same names, and Blume's are altogether omitted. I have now enumerated fifteen species of *Rhizophoreæ veræ*, from which we must deduct one from America and another from New Holland not found in East India. Of the remaining thirteen, one from Cochin China is scarcely known; a second extends throughout the Indian ocean, from the Mauritius to the Moluccas or perhaps Timor, and as far north as Arabia Felix and Bengal; a third is found in Malabar, Timor, and New Holland; three appear to be confined to the Eastern Islands; two to Malabar; one is common to Malabar and the mouth of the Ganges; two found at the mouth of the Ganges occur probably also further east and in Penang; and the remaining two seem to have been observed (unless different species are alluded to by different authors) in Ceylon, Malabar, Bengal, Java and Amboina. To these thirteen have to be added Roxburgh's two species of *Carallia* with ser-

rated, and the four species or varieties I have mentioned with entire leaves: so that although Loureiro's *Rhiz. hexagona* were reduced, the number is about double of that given by Martius. This order is thus concentrated in India or its islands; the only known exceptions consist in the two or perhaps three species of *Rhizophora* and one *Carallia* that occur further west, and one *Ceriops* and one *Bruguiera* that are found in New Holland; but of these, two are also natives of India.

Arlary, Kinross, Dec. 1837.

XL.—On *Habenaria bifolia* and *chlorthan*. By CHARLES C. BABINGTON, M.A., F.L.S., F.G.S., &c.

To the Editor of the *Annals of Natural History*.

Dear Sir,

AT page 315 of the 4th edition of his 'Brit. Flora,' recently published, Sir W. Hooker having expressed his opinion that the *Habenaria chlorthan* of my paper (Linn. Trans. xvii. 462) is not the same as the plant figured by Reichenbach at t. 853, f. 1145, of his Iconog. Botan., I feel it incumbent upon me to give my reasons for considering them as identical. The same excellent botanist appearing to doubt the correctness of my determination, that the *Orchis bifolia* of Linnæus is the same as my *H. bifolia* and *Platanthera brachyglossa*, Reich., I will add a few observations upon that subject.

Since the publication of the paper referred to I have obtained from Prof. Reichenbach himself a specimen of his *Plat. chlorthan*. It is No. 948 of his Flora German. Exsiccata, and has the following label appended:—"948, *Platanthera chlorthan*, Cust. and Rehb. Fl. Germ. 818. ic. 1145."

This specimen agrees exactly with those English ones contained in my herbarium. The shape of the petals, on which Sir W. Hooker lays much stress, is the same in the German and English specimens. In both they are narrower, and not so acute as in Reich. f. 1145: the above ticket shows however that the author of that plate considers my specimen as an example of the plant there figured. The colour of the flowers is known to be variable, and therefore I do not think that their not being very green in our plant is sufficient cause for

not considering it as identical with that of Reichenbach. As far as can be determined from a dried specimen, my German plant would appear to have had quite as white a hue as those gathered in this county and in other parts of England. My native specimens have the cells of the anther quite as divergent as they are represented in the figure quoted above.

Concerning *H. bifolia*, Bab., I need say but little. It accords exactly with the *only* specimen of *O. bifolia* preserved in the Linnæan Herbarium and with the figure (t. 852. f. 1144.) of Reichenbach; and I continue, after the examination of very numerous specimens of both plants, in a living state, to consider it as quite distinct from *H. chlorantha*, Cust. and Bab.

The *Pt. bifolia*, Reich., *H. fornicata*, Bab., must continue to be considered as a very doubtful plant, until we can either obtain authentic specimens from Germany or discover it in England. From not having access to specimens, I have thought myself bound to continue it as a distinct species until the permanency of its characters can be determined. I have never observed a hooded anther in any of the specimens of *H. bifolia*, Bab., which have come under my notice; and since the Linnæan Herbarium shows that Reichenbach's plant is not the true *O. bifolia*, Linn., I was obliged to give it a new name.

Sir W. Hooker not having mentioned the characteristic differences between the two native plants, I trust that I shall not do wrong by repeating them here for the information of those botanists who do not see the Linnæan Transactions.

1. *H. chlorantha*, Bab. Calcare ovario duplo longiore subclavato, labello lineari integerrimo, petalis superioribus conniventibus obtusis, anthera inferne duplo latiore truncata: loculis oblique ascendentibus et apice convergentibus. *E. B.* t. 22.
2. *H. bifolia*, Bab. Calcare ovario duplo longiore subclavato, labello lineari integerrimo, petalis superioribus conniventibus obtusis, anthera oblonga truncata: loculis parallelis. *Bab. in E. B. Supp.* t. 2806.

In the former the anther is very large and broad, the bases of its cells twice as far apart as their tops; the central line between the cells elevated into a prominent ridge in front and grooved on the back; the stigma is very broad, slightly pointed in the middle, and curved into a semicircular form.

In *H. bifolia* the anther is truncate or slightly emargi-

nate, rarely somewhat rounded at the top; its cells are nearly parallel throughout their whole length; the central line between the cells is a deep furrow in front and a keel behind, and the stigma is rather broad, truncate, folded so as to leave a channel between its pointed lobes, its middle emarginate.

H. fornicata, Bab., Pl. bifolia, Reich., has a hooded anther with parallel cells and the upper petals not converging.

St. John's Coll., Cambridge, May 18, 1838.

XLI.—*Floræ Insularum Novæ Zelandiæ Precursor; or a Specimen of the Botany of the Islands of New Zealand.* By ALLAN CUNNINGHAM, Esq.

[Continued from p. 216.]

EUPHORBIACEÆ, *Ad. de Juss.*

1. EUPHORBIA, *L.*

339. *E. glauca*, caule fruticoso, foliis ad apices ramorum confertis lanceolatis integerrimis glabris, umbella 4—6 radiata, radiis simplicibus trichotomisque, foliis floralibus oppositis ovali-acutis, involucri 4—5 fidis. *Endl. Prodr. Fl. Norf. p. 86. Forst. Prodr. n. 208. Spreng. Syst. Veg. iii. p. 790. A. Rich. Fl. Nov. Zel. p. 352. Ic. Ferd. Bauer, t. 166. (Endl.)—Kekiri gnott* of the natives, around whose houses the plant is frequent. *D'Urville.*

New Zealand (Middle Island), Astrolabe Harbour.—1827, *D'Urville.* (Northern Island), sandy shore, at the embouchure of the Hokianga river.—1820, *A. Cunningham.*

SANTALACEÆ, *R. Br.*

1. MIDA, (*Thesium*, *Linn.*)

Perianthium 5-partitum, persistens, eglandulosum. *Disco epigyno* nullo.

Stam. 5, extus fasciculo gracili villorum munita. *Antheræ* biloculares.

Stigma 3—4 lobum. *Nux* corticata coronata. *R. Br. in obs.* :—Arbusculæ glabræ, ramis ramulisque plerumque alternis. Folia *alterna*, quandoque *subopposita*, utrinque *glabra*, *nitida*, *venosa*. Flores *racemosi axillares s. terminales*. Nomen vernaculum *Mida*, unde nom. generis.

R. Cunningham.

340. *M. salicifolia*, foliis angusto-lanceolatis attenuatis.

New Zealand (Northern Island). A slender tree fifteen feet high, bearing flower and fruit in October, in the forests of Wangaroa.—1826, *A. Cunningham.*—1834, *R. Cunningham.*

341. *M. eucalyptoides*, foliis lanceolatis acuminatis.

New Zealand (Northern Island). A small tree fifteen to twenty feet high, in fruit in October and November in shady woods at Wangaroa.—1826, *A. Cunningham.*

312. *M. myrtifolia*, foliis ovalibus ovato-lanceolatis obtusiusculis acuminatisve.

New Zealand (Northern Island). A tree thirty feet high; growing in woods in the neighbourhood of the Bay of Islands.—1826, *A. Cunningham*.

THYMELÆÆ, *Juss.*

1. PIMELEA, *Banks and Solander, Sm.*

(*Passerina et Banksia*, *sp. Forst.*)

313. *P. Guidia*, *Vahl. Willd. Sp. Pl.* 1. p. 50. *Ræm. & Sch. Syst. Veg.* 1. p. 274. *A. Rich. Fl. Nov. Zel.* p. 171.—*Banksia Guidia. Forst. Gen. Char.* p. 8.—*Cookia Guidia. Gmel. Syst. Veg.* p. 24.

New Zealand (Middle Island), upon rocks on the shores of Dusky Bay; also on the summits of the mountains.—1773, *G. Forster*.—1781, *A. Menzies, Esq.* Astrolabe Harbour.—1827, *D'Urville*.

Obs. Frutex bi- vel tri-orygalis, erectus, ramosissimus, glaberrimus. *Flores* albi odorati, extus non raro carnei. *Perianthium* externe villosum.

344. *P. pilosa. Vahl. Willd. Sp. Pl.* 1. p. 50. *Ræm. et Sch. Syst. Veget.* 1. p. 275. *A. Rich. Fl. Nov. Zel.* p. 172.—*Banksia tomentosa. Forst. Char. Gen.* p. 8.—*Cookia pilosa. Gmel. Syst. Veg.* p. 24.

New Zealand (Middle Island), in thickets on the coast, as also in the mountainous districts.—1773, *G. Forster*.

Obs. Caulis fruticosus erectus, $\frac{1}{2}$ orgyalis, glaber. *Ramuli* albo villo vestiti. *Folia* opposita, linearia, obtusa. *Flores* albo-sericeæ.

345. *P. virgata. Vahl. Enum.* 1. p. 306. *Ræm. et Sch. Syst. Veget.* 1. p. 275. *A. Rich. Fl. Nov. Zel.* p. 173.—*P. axillaris. Banks and Sol. Mss.*—*Kai-Kai Atuanu. Incol. Anglice*, "The food of the Great God."

New Zealand (Northern Island).—1769, *Sir Jos. Banks*. Among under-wood and in bushy moist grounds, Bay of Islands.—1826, *A. Cunningham*.—1834, *R. Cunningham*.

346. *P. prostrata. Vahl. Willd. Sp. Pl.* 1. p. 51. *Ræm. et Sch. Syst. Veget.* i. p. 274. *A. Rich. Fl. Nov. Zel.* p. 174.

New Zealand (Middle Island), on barren mountains.—1773, *G. Forster*. Shores of Astrolabe Harbour.—1827, *D'Urville*. (Northern Island,) in open fern grounds, Bay of Islands.—1826, *Allan Cunningham*.—1834, *R. Cunningham*.

347. *P. arenaria*, foliis decussato-oppositis ellipticis obtusiusculis patentibus, supra glabris, subtus cano-hirtis, floralibus capitulum 5—7 florum sub-æquantibus, perianthii tubo brevissimo subaristato lanuginoso persistente, styli staminibus parum longiore, fructu baccato. *Accum in Bot. Mag.* t. 3270.—*Ou-tato-rangha* of the natives. *Rich. Cunningham*.

New Zealand (Northern Island), sandy ridges at the mouth of the Hokianga River.—1826, *A. Cunningham*. At Takou, on the east coast, near Wangaroa.—1834, *R. Cunningham*.

348. *P. Urvilleana*, foliis (parvulis) oppositis ovalibus obtusis glabris, capitulis 6—8-floris, perianthii tubo brevissimo, externe dense albido-sericeo,

laciniis patulis suborbicularibus obtusis, staminibus brevissimis fauci insertis, stylo tubo perianthii duplo longiore. *A. Rich. Fl. Nov. Zel.* p. 175.

New Zealand (Middle Island), shores of Tasman's Bay.—1827, *D'Urville*. (Northern Island), on dry hills, among fern, Bay of Islands.—1834, *R. Cunningham*.

PROTEACEÆ.

1. *PERSOONIA*, *Smith*.

349. *P. Tora*, foliis elongato-laciniatis acutis basi attenuatis strictis subfalcatis obsolete trinerviis utrinque glabris nitidis, racemis axillaribus laterali-
busve multifloris, pedunculis perianthiisque tomento ferrugineo tectis, ovariis glabris dispermis epedicellatis, caule arborescenti, cortice levi. *A. Cunn. in Bot. Mag.* t. 3513.—*Tora* incolis audit, unde nomen triviale.

New Zealand (Northern Island), on the wooded ridges of the highest hills near Wangaroa, near the shores of the Bay of Islands, and in the great Forest near Hokianga, &c.—1826, *A. Cunningham*.—1833, *R. Cunningham*.

Obs. Arbor sempervirens, 20—40 pedes alta, potius gracilis, admodum venusta, et in habitu omnino aliquot specierum *Acaciarum aphyllarum*, trunco erecto ad basin diametro 6 uncias æquante, cortice lævi, sursum ramosissimo. *Folia* alterna, versus apices ramulorum confertiora, elongata, coriacea, valde glabra, supra nitidissima, venosa, sæpe sex uncias longa, et semiunciam lata. *Racemi* plerumque axillares, erecti multiflori, tomento rubiginoso tecti, flores unibracteati. *Ovarium* glabrum, dispermum, sessile, vel epedicellatum. *Glandulæ hypogynæ* 4, brevissimæ. *Stigma* depresso-capitatum. *Drupa* baccata, putamine biloculari.

2. *KNIGHTIA*, *Brown in Linn. Soc. Trans.*, v. 10.

350. *K. excelsa*, foliis oblongo-ellipticis lanceolato-oblongisve obtusis coriaceis glabris profunde serratis, serraturis remotis, racemis axillaribus subsessilibus multifloris, perianthiis ferrugineo-tomentosis, bracteis (parvis) solitariis deciduis, stylis elongatis persistentibus, caule arborescenti. *Br. in Linn. Soc. Trans.* vol. x. p. 194. *tab. Rœm. et Sch. Syst. Veget.* iii. p. 431.—*Rewa-rewa* of the natives. *Yate*.

Obs. Distinctum a *Ropala* affini, seminibus quaternis, apice solum alatis.—*R. Br.*

*New Zealand (Northern Island), east coast. A noble tree, often eighty feet high, discovered at Opuraga (Mercury Bay, in lat. 36° 45' S.) and near Tolaga (Howa-Howa Bay, 38° 22' S.)—1769, *Sir Jos. Banks*. Dry forests near the Bay of Islands and Wangaroa.—1826, *A. Cunningham*.—1833, *R. Cunningham*.

* The hitherto very obscurely known *Embothrium strobilinum* of M. Labillardière, erroneously stated by that author to be a native of Western Australia (Terra de Leuwin), has been at length ascertained by Mr. Brown to belong to the above genus, its ovary containing 4 ovules. The structure however of the matured seeds is not yet ascertained. In the mean time, it may be considered a *Knightia*, though, as Mr. Brown suggests, of a distinct section from *K. excelsa*, and may be thus characterized:

K. integrifolia (*Encarpha*), foliis obovato-oblongis subspathulatis integris, racemis densis obovato-capitatis, axillaribus pedunculatis, perianthiis glabris,

The wood of the *Rewa-rewa* is beautifully variegated, being mottled with red, upon a ground of light brown; it is therefore well adapted for making articles of elegant furniture. The freedom with which it splits causes it to be far more frequently employed for paling-fences; but roofing-shingles made of it are found to warp readily with the sun.

LAURINÆ, *Ventenat.*1. LAURUS, *L., Brown.*

Flores hermaphroditi aut dioici. *Perianthium* 6-fidum æquale. *Stamina* 12, duplici ordine; exteriora 6 fertilia, interiora 6 exterioribus opposita, horum 3 sunt fertilia, basi biappendiculata aut biglandulosa, cetera alterna sterilia. *Antheræ* biloculares. *Stigma* capitatum. *Drupa* nuda monosperma.

351. *L. Tarairi*, arborea, foliis lato-ellipticis coriaceis obtusis petiolatis, supra glaberrimis, subtus venosis glaucis ramulisque tomentosis, racemis paniculatis ferrugineo-lanatis axillaribus terminalibusve, foliolis perianthii oblongo-ellipticis acutiusculis.—*L. macrophylla*. (*A. C. Mss.* 1826, non *Don.*) *Tarairi Incol.*

New Zealand (Northern Island). A tree fifty to seventy feet high, in dry woods on the banks of rivers, Bay of Islands, Wangaroa, &c.—1826, *A. Cunningham*.—1834, *R. Cunningham*.

Obs. The timber is white and splits freely, but is seldom employed.

352. *L. Tawa*, arborea, foliis lanceolatis acuminatis subundulatis minutissime venoso-reticulatis, supra glabris nitidis, subtus glaucis adpresso-sericeis, racemis paniculatis pilosiusculis terminalibus, pilis cinereis sparsis, ramulis petiolisque foliorum juniorum tomentosis, perianthii laciniis ovalibus obtusis.—*Tawa*, Indigenis.—*L. salicifolia*. *Banks et Sol. Mss.* non *Swartzii*.

New Zealand (Northern Island).—1769, *Sir Jos. Banks*. A tree forty to sixty feet high, frequent in shaded moist forests, at the Bay of Islands, &c.—1826, *A. Cunningham*.—1834, *R. Cunningham*.

The wood of the *Tawa* is light, and on account of the facility with which it splits is used by the natives for their short fences. It decays, however, in the course of two years and becomes perfectly useless; but as the New Zealanders seldom cultivate one spot for a longer period than two successive years, they do not experience the inconvenience which would otherwise accrue from the rapid decay of

bracteis (maximis) ellipticis imbricatis mox deciduis, stylis caducis, caule fruticoso.—*Embothrium strobilinum*. *Labill. Nov. Holl.* ii. p. 116. t. 265. *Ræm. et Sch. Syst. Veg.* iii. p. 432. (*vide fig.*)

Hab. In Nova Caledonia, *Labill.*, sed nunquam Terra Van Leuwin, incola.

Obs. *Frutex* orgyalis, ramis teretibus erectis. *Folia* petiolata, obovata, integra, venosa, infra attenuata. *Gemmae floriferæ* axillares solitariae, pedunculatae, strobiliformes, bracteis ovatis deciduis. *Folliculus lignosus*, oblongus, hinc gibbus. (*Ex Labill. loc. cit.*)

the wood. The fruits of both of the species, that of the *Tarairi* resembling a Damascene in size and appearance, are eagerly devoured by the large wood pigeon; and the aborigines, when they are traversing their native forests, and happen to be provided with muskets, always halt awhile beneath these trees in their fruit season (the months of October and November) for the chance of a shot. The islanders themselves also eat the fruit when boiled; by which process the poison, which abounds in it in a raw state, is extracted.

353. *L. ? calicaris* (Soland.); dioica, foliis ellipticis ovato-lanceolatisve acuminatis venosis, supra nitidis, subtus glaucis, umbellis femineis axillaribus glomeratis pedunculatis subquinquefloris, pedicellis cinereo-villosis, involucri pentaphyllis imbricatis, foliolis subrotundis latissimis perianthis 7—8 fidis, laciniis oblongis acutis, pedunculis fructûs incrassatis apice dilatatis calyciformibus. *Banks and Sol. Mss.*—*Tetranthera* Tangao. *R. Cunn. Ms.* 1834.—Tangao, *Indigenis*.

New Zealand (Northern Island).—1769, *Sir Jos. Banks*. River sides at the Bay of Islands.—1831, *R. Cunningham*.

I have never seen the male flowers, and am therefore ignorant of the structure of the anthers; but as the stigma, in all the female flowers examined, is dilated and more or less lobed, it seems probable that it may be a genuine species of *Tetranthera*, to which genus *R. Cunningham* has referred it. He has described the male flowers as involucreted and subsessile. In the absence, however, of more perfect materials, I have placed it with Solander's in the Linnæan genus *Laurus*, to which all the plants of the order were in his day referred.

ATHEROSPERMEÆ, *R. Br.*

Flores dielines, vel hermaphroditi. *Calyx* monophyllus, limbo diviso, laciniis sæpe duplici serie. *Squamulæ* faucis in fœm. et hermaphr. *Cor.* 0. *Stamina* in masculis floribus numerosa, fundo calyci inserta. *Antheræ* adnatæ, biloculares, loculis valvula longitudinali a basi ad apicem dehiscenti. *Ovaria* imo plura sæpius indefinita, monosperma, ovalo erecto. *Styli* simplices. *Stigmata* indivisa. *Pericarpia* clausa seminiformia stylis persistentibus plumosis aristata, tubo aucto calycis inclusa. *R. Br.*—Genera *Atherosperma*, *Laurelia*.

1. LAURELIA, *Juss.*

(*PAVONIA*, *Ruiz*, non *Cavanill.*)

Flores monoici vel dioici. ♂. *Perianth.* monophyllum. *Tubus* campanulatus seu brevissimo-cylindricus, limbus 5—13 fidus, laciniis (imbricatis) 2—3-plici dispositis. *Stamina* 7—14 ad basin singula, glandulæ duæ subrotundæ sessiles. *Antheræ* ad apicem filamentorum utrinque adnatæ, biloculares, valvis elasticæ dehiscentibus apice filamentorum affixis, sursum spectantibus. *Squamulæ* 3 ad basin staminum.

♀ *Perianthium* ut in mare? *Squamulæ* pluræ ovatæ, per discum floris sparsæ. *Pistilla* numerosa, villosa. *Pericarpium* corticatum, e perianthia tubo efformatum intus pilosum, stigmatibus prominulis coronatum, in quatuor partes patentes dehiscens. *Caryopses* plures, subulatæ, pilosæ. Arbores (*Chilenses et Novæ Zelandiæ*) *glaberrimæ, semper-virentes* (odore Lauri sassafras valde redolentes), 5—20 *orgyales et ultra*. Folia opposita ovalia, petiolata, serrata. Flores axillares, racemosi vel subcymosi.

354. **L. Novæ Zelandiæ*, dioica, foliis elliptico-oblongis obtusis coriaceis, racemis multifloris incano-villosis.

New Zealand (Northern Island). A tree thirty feet high, on the margins of the streams falling into the Keri-Keri river.—1826, *A. Cunningham*.

Of this very remarkable plant the tree bearing the female fructification has not been discovered in its native country. I have, nevertheless, not only placed it in Mr. Brown's family *Atherospermeæ*, to which it most assuredly belongs, as indicated by its opposite serrated leaves and by the structure and mode of dehiscence of its anthers, which, however, accord with those of the *Laurinæ*, but I have referred it to *Pavonia* of Ruiz and Pavon, of which it appears a second species, although it is diœcious, and the female flower and fruit remain yet to be examined.

[To be continued]

XLII.—Descriptions of British Chalcidites. By FRANCIS WALKER, F.L.S.

[Continued from p. 312.]

Sp. 6. *Cirrospilus* *Lyncus*, Mas. et Fem. *Luteus viridi-varius, antennæ fulvæ, pedes flavi, alæ sæpe fulvescentes.*

Fem. Luteus: caput postice fuscum, fascia vertici viridis, ocellis confinis: oculi et ocelli rufi: antennæ fulvæ; articuli 1^{us} et 2^{us} supra fusci: thorax viridis: mesothorax luteus, scutum antice et scutellum viridia: abdomen luteum, segmenta media postice, discus et apex viridia: oviductus fulvus; vaginæ fuscæ: pedes læte flavi; coxæ basi virides; pulvilli fulvi; alæ fulvescentes; squamulæ flavæ; nervi flavi.

Mas. Flavus: capitis vertici fascia viridis: antennæ fulvæ; pro- et mesothorax supra virides: mesothorax apud proalis squamulas fulvescens; scutum anticum et scutellum posticum viridia: abdomen apice pallide fuscum:

* The type of the genus is *L. Chilensis*, which may be thus defined:

L. Chilensis; monoica foliis ovatis oblongisve acutis, racemis subtripartitis cymosis glabris.—*L. aromatica*, *Juss. Spreng. Syst. Veg.* vol. ii.—*Pavonia sempervirens*, *Ruiz et Pavon Syst. Veg. Floræ Peruv. et Chil.* (8vo.) 1. p. 253. *Fl. Peruv. et Chil. Prodr.* (fol.) p. 127. tab. 28.—*Thiga Chilensis*, *Molini, conf. Spreng.*

Hab. In regno Chilensi. Arbor 40 ulnarius et ultra.

pedes læte flavi; pulvilli et protarsi fulvi: alæ subfulvescentes. (Corp. long. lin. $\frac{1}{2}$ —1; alar. lin. $\frac{3}{4}$ —1 $\frac{1}{2}$.)

Var. β. Fem.—Parapsides viridi-fusco maculatæ: abdomen viridi-cupreum, basi luteum; segmentum 1^{um} utrinque viridi-maculatum.

Var. γ. Fem.—*Var. β.* similis: caput supra et postice fere omnino viride mesothoracis scutum viride, postice luteum: parapsides viridi maculatæ.

Var. δ. Fem.—*Var. γ.* similis: abdomen cupreo-viride, subtus basi fulvum; segmentum 1^{um} apice fulvescens: procoxæ virides.

Var. ε. Fem.—*Var. δ.* similis: mesothoraci viridi fascia angusta flava.

Var. ζ. Fem.—*Var. δ.* similis: mesothorax viridis; parapsides plerumque luteæ.

Var. η. Fem.—Caput supra et postice viride: antennis articuli 1^{us} et 2^{us} omnino fulvi: mesothorax viridis, scutum postice fulvum, parapsides flavæ: abdomen cupreum, basi fulvum; segmentum 1^{um} basi utrinque viride: alæ limpidæ.

Var. θ. Fem.—*Var. η.* similis: antennæ obscure fulvæ; alæ fulvescentes.

Var. ι. Fem.—Caput postice flavum: antennis articulus 2^{us} fulvus, basi pallide fuscus: thorax luteus: pro- et metathorax supra virides: mesothoracis scutum viride, apice luteum, parapsides fusco maculatæ, scutellum late fusco vittatum: abdomen flavum, fusco late et dilute fasciatum; segmentum 1^{um} basi fuscum: coxæ flavæ: alæ limpidæ.

September; near London, Isle of Wight. Ireland, Mr. Haliday.

Mas. Corpus angustum, sublineare, sat longum, parum convexum, nitens, scitissime squameum, parce hirtum: caput magnum, transversum, thorace latius; vertex latus; frons impressa, abrupte declivis: oculi sat magni, subrotundi, extantes: ocelli vertice triangulum fingentes, media perparum anteposita: antennæ graciles, extrorsum crassiores, prope os insertæ, corporis dimidio multo longiores; articulus 1^{us} ovatus, dilatatus, maximus; 2^{us} angustus, subfusiformis; 3^{us} brevissimus; 4^{us} et sequentes ad 7^{um} longi, sublineares; clava triarticulata, fusiformis, acuminata, articulo 7^o plus duplo longior et paullo latior: thorax longiovatus, convexus, fere lævis: prothorax transversus, sat bene determinatus, antice abrupte acuminatus, postice latus incurvus: mesothoracis scutum longitudine paullo latius; parapsidum suturæ remotæ, bene determinatæ; paraptera et epimera magna; scutellum subovatum; postscutellum transversum: metathorax brevis: petiolus brevissimus latissimus: abdomen longiovatum, depressum, thoraci fere quoad longum ac latum; segmentum 1^{um} magnum; 2^{um} et sequentia breviora, transversa, subæqualia: pedes graciles, pubescentes, simplices, subæquales; coxæ parvæ; femora subclavata; tibiæ rectæ; tarsis articulus 1^{us} brevis, 2^{us} et 3^{us} longiores, 4^{us} adhuc longior; pulvilli magni: alæ perangustæ, breviter ciliatæ: proalis nervus hirtus costæ dimidio paullo longior, ulnaris humerali vix brevior, cubitalis longus, radialis brevissimus; stigma minutum: metalis nervus simplex costæ dimidio longior.

Sp. 7. *Cirr. Crino, Mas. Cupreo-viridis flavo varius, antennæ fulvæ, pedes flavi, alæ limpidæ.*

Caput flavum: oculi et ocelli rufi: antennæ pallide fulvæ; articulus 1^{us}

obscurior: thorax cupreo-viridis, apud paraptera et epimera flavus: abdomen cupreum, apice viride, dimidium fere anticum flavum: petiolus fulvus: sexualia pallide fulva: pedes læte flavi; tarsi apice fusci: alæ limpidæ; squamulæ flavæ; nervi flavi. (Corp. long. lin. 3; alar. lin. 3.)

Var. β.—Abdomen cupreo-viride, basi flavum.

June to August; on grass beneath trees, near London, Windsor Forest.

Mas. Corpus angustum, sublineare, nitens, scitissime squameum, parce hirtum: caput transversum, breve, convexum, thorace paullo latius: antennæ graciles corporis dimidio vix longiores; articulus 1^{us} maximus, dilatissimus; 2^{us} longicyathiformis; 3^{us} et 4^{us} breves, subquadrati; clava longiovata, brevisetigera, articulo 1^o latior et duplo longior: thorax longiovatus, convexus: prothorax transversus, sat bene determinatus: mesothoracis scutum longitudine paullo latius; parapsidum suturæ conspicuæ; scutellum obconicum: metathorax transversus, brevis: petiolus brevissimus: abdomen sublineare, planum, læve, thorace paullo brevius: pedes graciles: alæ angustæ, ciliatæ; nervus ulnaris humerali longior, radialis brevissimus, cubitalis sat longus.

Sp. 8. Cirr. Pacuvius, Mas. *Viridi-cupreus, antennæ piceæ aut fusæ, pedes fulvi, femora cuprea, alæ sublimpidæ. Entomologist Pl. IV, f. 2.*

Cupreo-viridis: oculi et ocelli rufi: antennæ piceæ: abdomen cupreum: pedes fulvi: coxæ cupreæ; femora cuprea; tibiæ fusæ, apice et basi fulvæ: alæ sublimpidæ; squamulæ piceæ; nervi fulvi. (Corp. long. lin. 3; alar. lin. 3.)

Var. β.—Antennæ fusæ; articulus 1^{us} piceus: tibiæ fulvæ, apice flavæ; tarsi flavi, apice fulvi.

Found near London. Ireland, Mr. Haliday.

Fem. Corpus angustum, sublineare, nitens, scite squameum, parce hirtum: caput transversum, brevissimum, convexum, juxta thoraci latum: oculi parvi, subrotundi: antennæ clavatæ, dimidio paullo breviores; articulus 1^{us} longus, sublinearis; 2^{us} longicyathiformis; 3^{us} sublinearis, sat longus; 4^{us} brevior et latior; clava ovata, articulo 4^o latior et duplo longior: thorax longiovatus, parum convexus; prothorax mediocris, transversus, antice angustior: mesothoracis scutum latitudine longius; parapsidum suturæ remotæ, bene determinatæ; scutellum ovatum, angustum; metascutellum obconicum, bene determinatum: metathorax mediocris: petiolus brevissimus: abdomen ovatum, thorace latius, vix brevius: pedes graciles: alæ longæ; nervus ulnaris humerali vix brevior, radialis brevissimus, cubitalis ad alæ apicem propensus.

Sp. 9. Cirr. Singa, Fem. *Cupreus, antennæ fulvæ, pedes flavi, alæ limpidæ.*

Læte cupreus: oculi et ocelli rufi: antennæ fusco-fulvæ; articulus 1^{us} nigro-æneus, apice fulvus: pedes lætissime flavi; tarsi apice fusci; propedum tibiæ extus fulvo vittatæ, tarsi fulvi: alæ limpidæ; squamulæ flavæ; nervi flavi. (Corp. long. lin. 3—4; alar. lin. 1—1½.)

September, North Wales. Ireland, Mr. Haliday.

Fem. Corpus angustum, sublineare, nitens, scitissime squameum, parce hirtum: caput transversum, breve, convexum, thoracis vix latitudine: an-

tennæ clavatæ, graciles, corporis dimidio paullo longiores; articulus 1^{us} gracilis, sublinearis; 2^{us} longicyathiformis; 3^{us} et 4^{us} breves; clava fusiformis, acuminata, articulo 4^o latior et plus duplo longior: thorax longiovatus, convexus: prothorax transversus, sat bene determinatus: mesothoracis scutum longitudine latius; parapsidum suturæ conspicuæ; scutellum obconicum: metathorax transversus, mediocris: petiolus vix ullus: abdomen longiovatum, planum, læve, subtus carinatum, thorace paullo brevius non latius: pedes validi, simplices, subæquales: alæ angustæ; nervus ulnaris humerali paullo longior, radialis brevissimus, cubitalis longus.

Cupreus: thorax fulvo interrupte bivittatus: oculi et ocelli rufi: antennæ fusco-fulvæ basi et apice flavæ: abdomen nigro-cupreum: pedes pallide fulvi; coxæ æneæ; tarsi apice fulvi: alæ limpidae; squamulæ flavæ; nervi flavi. (Corp. long. lin. $\frac{3}{4}$; alar. lin. 1.)

Found near London.

Sp. 10. Cirr. Phorbas, Fem. *Cupreus, antennæ fulvæ, thorax fulvo vittatus, pedes fulvi, alæ limpidae.*

Fem. Corpus angustum, sublineare, nitens, scitissime squameum, parce hirtum: caput transversum, breve, convexum, thoracis latitudine: antennæ clavatæ, corporis dimidio non longiores; articulus 1^{us} gracilis, sublinearis; 2^{us} longicyathiformis; 3^{us} et 4^{us} longitudine latiores; clava longiovata; articulo 4^o latior et plus duplo longior: thorax longiovatus, convexus: prothorax transversus, sat bene determinatus: mesothoracis scutum longitudine latius; parapsidum suturæ conspicuæ; scutellum obconicum: metathorax transversus, brevis: petiolus vix ullus: abdomen longiovatum, planum, læve, subtus carinatum, thorace paullo brevius et latius: pedes graciles: alæ mediocres; nervus humeralis ulnari longior, radialis brevis, cubitalis longus.

Sp. 11. Cirr. Arsames, Fem. *Cupreus, antennæ fusæ, pedes flavi, femora picea, alæ limpidae.*

Nigro-cupreus: oculi et ocelli rufi: antennæ fusæ: pedes pallide flavi; coxæ nigro-cupræ; femora nigro-picea, apice flava; tarsi apice fulvi; propedes tibiis et tarsis pallide fulvis: alæ limpidae; squamulæ fulvæ; nervi flavi. (Corp. long. lin. $\frac{1}{2}$; alar. lin. $\frac{3}{4}$.)

Found near London.

Mas. Corpus sublineare, nitens, scitissime squameum, parce hirtum: caput parvum, transversum, brevissimum, convexum, thorace angustius; vertex sat latus; frons abrupte declivis: oculi mediocres; non extantes: antennæ graciles, subfiliformes, pubescentes, thorace non longiores, articulus 1^{us} linearis, gracilis; 2^{us} longicyathiformis; 3^{us} latior, oblongus; 4^{us} 3^o brevior; clava fusiformis, acuminata, articulo 4^o fere duplo longior: thorax longiovatus, parum convexus: prothorax transversus, brevis, supra conspicuus: mesothoracis scutum planum, longitudine vix latius; parapsidum suturæ remotæ, non bene determinatæ; scutellum subrotundum; paraptera et epimera parva: metathorax sat magnus: petiolus brevis, gracilis: abdomen planum, thoraci fere quoad longum ac latum; segmentum 1^{um} magnum; 2^{um} et sequentia brevia, subæqualia; pedes graciles, recti, simplices, subæquales; tarsis articulus 1^{us} brevis, 2^{us} 3^o paullo longior, 4^{us} 2^o longior; un-

gues et pulvilli minuti : alæ longæ ; nervus humeralis ulnari vix longior, radialis sat longus, cubitalis longus, in alæ discum declivis, apice stigma fingens minutum integrum.

Fem. Antennæ latiores, breviores, subclavatæ : abdomen longi-ovatum, thorace angustius et paullo longius.

Sp. 12. *Cirr.* Minæus, Mas et Fem. *Æneus viridi et cyaneo varius, antennæ fusæ, pedes ænei, tarsi flavi, alæ limpidæ.*

Æneo viridis : oculi et ocelli rufi : antennæ fusæ ; articulus 1^{us} nigro-æneus ; 2^{us} nigro-fuscus : mesothoracis scutellum purpureo-cyaneum : abdomen nigro-æneum : pedes flavi ; coxæ viridi-æneæ ; trochanteres fusci ; femora viridi-ænea, apice flava ; tibiæ nigro-æneæ, apice et basi flavæ ; tarsi apice fusci ; protarsi fulvi, apice obscuriores : alæ limpidæ ; squamulæ fusæ ; nervi fusci. (Corp. long. lin. 1—1½ ; alar. lin. 1½—1¾.)

September, near London, Cornwall.

Mas. Corpus sublineare, depressum, nitens, scitissime squameum, parce hirtum : caput transversum, parvum, brevissimum, fere angustius : oculi parvi, subrotundi, non extantes : antennæ extrorsum crassiores, corporis dimidio non longiores ; articulus 1^{us} longus, validus, sublinearis ; 2^{us} longi-cyathiformis ; 3^{us} sublinearis, sat longus ; 4^{us} brevior et latior ; clava sublinearis, acuminata, articulo 4^o plus duplo longior : thorax longi-ovatus, parum convexus : prothorax sat bene determinatus, convexus, antice angustior : mesothoracis scutum fere planum, longitudine paullo latius ; parapsidum suturæ non bene determinatæ ; scutellum ovatum, angustum : metathorax mediocris, transversus : petiolus brevissimus : abdomen longi-conicum, depressum, thorace paullo brevius vix latius : pedes graciles ; tarsi articulus 2^{us} 1^o paullo brevior, 3^{us} adhuc brevior, 4^{us} 3^o longior ; ungues et pulvilli minuti : alæ longæ ; nervus ulnaris humerali vix brevior, radialis brevissimus ; cubitalis ad alæ apicem propensus.

Sp. 13. *Cirr.* Abdon, Mas. *Viridis cupreo-variis, antennæ picæ, abdomen cupreum, pedes virides flavo-cincti, alæ limpidæ.*

Æneo-viridis : oculi et ocelli rufi : antennæ picæ ; articuli 1^{us} et 2^{us} virides : scutellum purpureo-cupreum : abdomen cupreum : pedes virides ; trochanteres picci ; femora apice flava ; tibiæ picco-virides apice et basi flavæ ; protarsi fulvi ; meso- et metatarsi flavi, apice fusci : alæ limpidæ ; squamulæ picæ ; nervi pallide fusci. (Corp. long. lin. ½—¾ ; alar. lin. ¾—1.)

Var. β.—Thoracis discus cupreus.

Var. γ.—Tibiæ virides, apice et basi flavæ.

Var. δ.—*Var. γ.* similis : thoracis discus purpureo-cupreus.

Var. ε.—*Var. δ.* similis : thorax viridi-cyaneus ; mesothoracis scutellum cupreum.

Found near London.

Mas. Corpus sublineare, depressum, nitens, scitissime squameum, parce hirtum : caput transversum, parvum, brevissimum, vix thoracis latitudine ; vertex latus ; frons abrupte declivis : oculi parvi, subrotundi, non extantes : ocelli vertice triangulum fingentes : antennæ subclavatæ, corporis dimidio

fere breviores; articulus 1^{us} longus, sublinearis; 2^{us} longi-cyathiformis; 3^{us} sublinearis, sat longus; 4^{us} brevior et latior; clava conica, acuminata, articulo 4^o plus duplo longior: thorax longi-ovatus, parum convexus: prothorax sat bene determinatus, transversus, antice angustior: mesothoracis scutum fere planum, longitudine paullo latius; parapsidum suturæ remotæ, non bene determinatæ; scutellum ovatum, angustum: metathorax mediocris, transversus: petiolus brevissimus: abdomen longi-conicum, depressum, thorace paullo brevius vix latius; segmentum 1^{um} magnum; 2^{um} et sequentia breviora subæqualia: sexualia vix exerta: pedes graciles, simplices, subæquales; coxæ parvæ; femora subclavata; tibiæ rectæ; tarsis articulus 2^{us} 1^o paullo brevior, 3^{us} adhuc brevior, 4^{us} 3^o longior; ungues et pulvilli minuti: alæ longæ; nervus ulnaris humerali vix brevior, radialis brevissimus, cubitalis ad alæ apicem propensus stigmate minuto terminatus.

Fem. Antennæ clavatæ, corporis dimidio breviores; clava articulo 4^o duplo longior: abdomen ovatum, subtus carinatum.

Sp. 14. *Cirr. Isæa*, Mas et Fem. *Viridis cupreo-varius, antennæ nigra, pedes virides flavo-cincti, alæ limpida.*

Fem. Læte viridis: ocelli et ocelli rufi: antennæ nigra; articulus 1^{us} nigro-viridis: thoracis discus cupreus: abdomen disco et basi cupreo-varium: pedes virides; trochanteres fulvi; femora apice flava; tibiæ apice flavæ; tarsi fulvi, apice obscuriores; propedum tibiæ viridi-fuscæ, tarsi supra fuscii: alæ limpida; squamulæ fuscæ; nervi flavi.

Mas. Pro² et mesofemora flava, basi viridia. (Corp. long. lin. $\frac{3}{4}$ —1; alar. lin. 1—1 $\frac{1}{4}$.)

Var. β. Fem.—Capitis vertex cyaneo-viridis: abdominis segmenta apice cyaneo-viridia.

Var. γ. Fem.—Thorax supralæte cupreus: abdomen cupreum; segmenta 2^{um} et sequentia basi viridia.

Var. δ. Fem.—Thorax omnino viridis.

Var. ε. Fem.—Antennæ apice fuscæ: thorax æneo-viridis: abdominis segmentum 1^{um} viride, apice cupreo et purpureo-varium: protarsi fulvi.

Var. ζ. Fem.—Thorax viridis: mesothoracis scutellum cupreum: abdomen viridi-cyaneum, basi cupreo-varium.

Var. η. Fem.—Proalæ fulvescentes.

Var. θ. Fem.—*Var. η.* similis: femora ænea; tibiæ æneæ.

Var. ι. Mas.—Viridis: caput postice viridi-cupreum: thoracis discus cupreus: pedes virides; trochanteres fuscii; femorum et tibiarum apices pallide flavi; tarsi fulvi, apice fuscii.

September, near London, Isle of Wight, Devonshire, Cornwall, Wales, Scotland.

Sp. 15. *Cirr. Medidas*, Mas et Fem. *C. Isæa simillimus, minor et brevior at vix distinctus.*

Mas. Læte viridis: ocelli et ocelli rufi: antennæ nigra; articulus 1^{us} viridis: scutellum viridi-cupreum: sexualia pallide fulva: pedes læte flavi; coxæ virides; trochanteres fuscii; pro- et metafemora viridia, apice læte flava; mesofemora basi viridia; propedum tibiæ obscure fulvæ apice et basi

flavæ, tarsi fulvi; meso- et metapedum tibiæ piceo bicinctæ, tarsi fulvi, basi flavi apice fusci: alæ limpidae; squamulae piceæ; nervi flavi.

Fem. Antennæ fuscae; articuli 1^{us} et 2^{us} virides: mesothoracis scutellum cupreum: abdominis discus cupreus: propedum tibiæ flavæ, fulvo supra biplagiatae, tarsi basi flavescentes; meso- et metatibiæ piceo-viridi bicinctæ. (Corp. long. lin. $\frac{1}{3}$ — $\frac{1}{2}$; alar. lin. $\frac{1}{3}$ — $1\frac{1}{4}$.)

Var. β. Mas.—Viridis: antennæ fuscae; articuli 1^{us} et 2^{us} virides: abdomen supra viridi-cupreum: pedes lacte flavi; coxæ virides; trochanteres fusci; femora basi viridia; propedum tibiæ et tarsi fulva; meso- et metapedum tibiæ piceo bicinctæ, tarsi apice fusci.

Var. γ. Mas.—Antennæ fulvæ; articuli 1^{us} et 2^{us} virides: abdominis discus cupreus: propedum tibiæ fuscae, tarsi fulvi, apice fusci; meso- et metatibiæ piceo-virides, apice et basi flavæ.

Var. δ. Fem.—Capitis vertex viridi-cyaneus: thorax viridis, suturæ cupreo-virides: mesothoracis latera cyaneo-viridia.

Var. ε. Fem.—Thorax cyaneo-viridis: mesothoracis scutellum viridi-cupreum: protibiæ fuscae: meso- et metatibiæ virides, apice et basi flavæ.

Var. ζ. Fem.—Viridis: antennæ piceæ, basi virides: thoracis discus cupreo-viridis: abdomen supra cupreum: propedum tibiæ extus fusco-virides, tarsi fulvi apice fusci, meso- et metatibiæ viridi bicinctæ, horum fasciæ supra connexæ.

Var. η. Fem.—Var. ζ. similis: abdomen basi viride: protarsi fusci: meso- et metapedum tibiæ virides, apice et basi flavæ, tarsi flavi apice fusci.

Var. θ. Fem.—Meso- et metatibiæ fulvo bicinctæ.

Var. ι. Fem.—Viridis: thoracis discus cupreo-varius: abdominis discus cupreus: femora basi viridia; propedum tibiæ pallide fuscae, apice flavæ, tarsi fulvi; meso- et metapedum tibiæ virideæ, apice et basi flavæ, tarsi apice fusci.

Var. κ. Fem.—Viridis: thoracis discus cyaneo-varius: pedes flavi; coxæ virides; femora basi viridia; protibiæ extus fulvæ; protarsi fulvi; meso- et metapedum tibiæ piceo-virides fulvo cinctæ, tarsi apice fusci.

Var. λ. Fem.—Thorax cyaneo-viridis: abdominis discus viridi-cupreus.

Found near London.

Fem. Corpus sublineare, depressum, nitens, scitissime squameum, parce hirtum: caput transversum, parvum, brevissimum, vix thoracis latitudine; vertex latus; frons abrupte declivis: oculi parvi, subrotundi, non extantes: antennæ clavatae, corporis dimidio breviores; articulus 1^{us} longus, sublinearis; 2^{us} longi-cyathiformis; 3^{us} sublinearis, sat longus; 4^{us} brevior et latior; clava conica, acuminata, articulo 4^o duplo longior: thorax ovatus, parum convexus: prothorax sat bene determinatus, transversus, antice angustior: mesothoracis scutum fere planum, longitudine paullo latius, parapsidum suturæ non bene determinatæ; scutellum ovatum, angustum: metathorax mediocris, transversus: petiolus brevissimus: abdomen ovatum, depressum, juxta thoraci longum, subtus carinatum: pedes graciles; tarsi articulus 2^{us} 1^o paullo brevior, 3^{us} adhuc brevior, 4^{us} 3^o longior; ungues et pulvilli minuti: alæ longæ; nervus ulnaris humerali vix brevior, radialis brevissimus, cubitalis ad alæ apicem propensus.

[To be continued.] *✓. 444*

XLIII.—Catalogue of the Slender-tongued Saurians, with Descriptions of many new Genera and Species. By JOHN EDWARD GRAY, Esq., F.R.S., Senior Assistant in the Zoological Department of the British Museum, &c.

[Continued from p. 283.]

**** Sides with a narrow impressed line; back, belly, and tail covered with cross bands of 4-sided shields; throat shielded.**

Fam. III. ZONURIDÆ.

A. Lizard-like; ears exposed; legs 4; femoral pores distinct. Old World.

Zonurus. Head depressed, broad behind; supraorbital plate expanded. Tail depressed, with whorls of large square keeled spinose scales; back with keeled subspinose, belly with smooth scales. Toes 5—5.

** Back and sides covered with large, rhombic, obliquely-keeled, dagger-pointed scales; lateral line narrow.*

a. Dorsal scales spinose.

Zonurus-Novæ-Guineæ, Schlegel, l. c. t. 7. f. 2.

New Guinea.

b. Dorsal scales all keeled.

Zonurus cataphractus. Reddish; middle of the back varied with olive; scales of neck ovate, keeled, spreading; temporal shields keeled, subpyramidal. Tail spinose.

Cape of Good Hope.

Zonurus cordylus. Pale brown, darker spotted; dorsal and lateral scales in sixteen series; tail slender, elongate.

Cape of Good Hope.

c. The central dorsal series of scales flat, smooth.

Zonurus vertebralis. Pale brown; lateral and neck scales keeled, dagger-pointed.

Cape of Good Hope.

**** Back covered with large keeled scales, with a vertebral series of small scales; sides covered with small and rather larger, scattered scales.**

Zonurus Davyi. Black? Temporal scales large, smooth, many-sided; three pairs of præanal plates, hinder largest.

Cape of Good Hope.

***** Back and sides with small scales having series of larger convex slightly keeled scales on the sides of the back and upper parts of the sides.**

Zonurus microlepidotus. *Cordylus microlepidotus*, Cuv., Guerin, *Icon*. t. 6. f. 1.

Cape of Good Hope.

Cicigna, Gray, 1829. *Gerrhosaurus*, Wiegman. *Pleurostichus*, A. Smith. Head pyramidal; tail rather compressed, armless; scales of the back armless, of the belly smooth. Toes 5—5.

Cicigna sepiformis. *Scincus sepiformis*, Schn. *Lac. scpiformis*, Gmel. *Gerrho. flavigula* Wiegman., *Wagler Icon*. t. 34. f. 1. *Pleurostichus typicus*, Smith, l. c.

Cape of Good Hope.

Cicigna Desgardinii. *Pleurostichus Desgardinii*, Smith, l. c. 143.

South Africa. East coast of the Cape of Good Hope.

Cicigna chrysobroncha. *Pleurostichus chrysobronchus*, Smith, l. c.

South Africa. Damp woody situations about Graham Town, Cape of Good Hope.

Tachydromus. Toes 5—5. Body very long; scales rhombic, lateral line wide, femoral pores one pair on each thigh.

Tachydromus typus. Brown with a broad greenish silvery stripe along each side of the back; sides with a few small silvery spots; upper lip and beneath silvery; back with four series of large, and belly with six series of smaller keeled scales. Tail four times as long as the body.

China.

Caitia, Gray. Body very long, front feet very slender, elongate, rudimentary; hinder feet short, compressed, thick, rudimentary, undivided, with two large femoral pores on each thigh. Tail very long and slender.

Caitia Africana. Olive brown, rather paler on the sides.

Cape of Good Hope.

B. Lizard-like; ears exposed; legs 4; femoral pores none. New World.

Abrodon, Gray. Head depressed, with an odd anterior central plate between the 4 or 6 polygonal frontal ones; back and tail with smooth or very obscurely keeled scales; toes 5—5; tail round, tapering, about as long as the body.

* *Scales of the back smooth; head depressed.*

Ab. Deppii. G. Deppii, Wiegman. *Herp. Mex.* t. 9. f. 2. Above black, white spotted scales of the back very smooth, lateral plait obsolete; toes with large rounded warts below.

Mexico.

** *Scales of the middle of the back obsoletely keeled, of the sides smooth; head subdepressed.*

Ab. tæniatus, G. tæniatus, Wieg. *Herp. Mex.* t. 6. f. 1. Bluish-white, black banded.

Mexico.

GERRHONOTUS, Wieg. *Cordylus*, De Blainv. Head pyramidal with an odd anterior central plate between the 4 or 6 polygonal frontal ones; toes 5—5; tail round, tapering, about as long as the body; back and tail with keeled unarmed scales forming continued ridges on the back.

Gerrhonotus caruleus, Wieg. *Herp. Mex.* 31.

Brazil.

Gerrhonotus tessellatus, Wieg. *Herp. Mex.* 31. t. 10. f. 3. (head). *Scincus ventralis*, Green.

Jun. *Gerrho. liocephalus*, Wieg.

Mexico.

Gerrhonotus Burnetti, Gray, Beechey's Voyage, t. ined. Pale olive, sides with cross bands of white tipped dark brown scales, beneath white brown; back with 16, belly with 12 rows of scales; tail thick, as long as the body and head.

South America.

Brit. Mus.

BARISIA. Head pyramidal, without any odd anterior central plate between the two or three pairs of frontal ones. Toes 5—5; tail round, about as long as the body. Back and tail with round keeled unarmed scales.

* *Ventral plates 14-rowed.*

Barisia rudicollis, Gray. *Gerrhonotus rudicollis*, Wieg. *Herp. Mex.* t. 10. f. 1. and 4.

Mexico.

** *Ventral plates 12-rowed.*

Barisia imbricata, Gray. *Gerrhonotus imbr.*, Wieg. *Herp. Mex.* t. 10. fig. 2. and 5.

Mexico.

Barisia lichenigerus. *Gerrhonotus lichenigerus*, Wagler, *Icon. Amph.* t. 34. f. 2. *Gerrho. adpersus*, Wieg. *Herp. Mex.* t. 10. f. 6. (Head).

Mexico.

ELGARIA. Head pyramidal with a large central anterior frontal plate placed between two pairs of very narrow long band-like anterior, and a pair of large 6-sided posterior frontals. Occipital plates scale-like. Back and tail with slightly keeled armless scales. Toes 5—5, limbs weak; tail much longer than the body, slender.

Elgaria Kingii. *Gerrhonotus Kingii*, Bell. MSS. Pale brown, head brown spotted with two diverging streaks on each side of the occiput; back and tail with brown cross bands, some of the scales

on the sides tipped with white; scales of the back slightly keeled, of the sides smooth; on the back 16, on the belly 12-rowed.

Hab. — ? Brit. Mus.

Elgaria multicarinata. *Gerrhonotus multicarinata*, *De Blainv. Nov. Ann. Mus.* 1838, t. 28. f. 2. appears to be a second species of this genus if it is not a specimen which has the tail reproduced. In the figure the occipital plates are represented much more distinct than in our specimen.

C. Snake-like; legs 2, rudimentary or none; femoral pores none; ears exposed.

Pseudopus, Merrem. Legs 2, posterior, rudimentary, undivided. Old World.

Pseudopus Pallasii, Cuv. R. A. ii. p. 69. *Lacerta apoda*, *Pallas*. *Ophisaurus serpentinus*, *Eichw.* *Bipes Pallasii*, *Wagler*. *Pseud. serpentinus*, *Merrem*.

Young? *Pseudopus Durvillii*, Cuv. *Guerin Icon.* t. 17. f. 1. Apodal Lizards, *Shaw Zool.* t.

Europe.

ORHISAURUS, Daud. Legs none; tail long. New World.

Ophisaurus ventralis. *Anguis ventralis*, *Linn.*

North America.

Ophisaurus lineatus. Yellowish brown with a set of three black and yellow streaks above the lateral line; belly bluish; top of the head and sides of the neck brown, spotted.

North America. Mus. Col. Surgcons.

Fam IV. CERCOSAURIDÆ.

The body subcylindrical, sides rounder with scales like the back; back and upper part of the tail with rings of large keeled scales forming longitudinal series; throat, belly, and tail beneath, with flat square shields.

CERCOSAURA, *Wagler*. Scales of the back large, oblong, quadrate, compressed, keeled; throat with a double series of imbricate shields; collar rather distinct; tail roundish, compressed. Toes 5—5; ears conspicuous; upper eyelid small; supraorbital plate thin; femoral pores none.

Cercosaura ocellata, *Wagler Amph. Syst.* 158.

Hab. — ?

Cercosaura Schreibersii, *Wiegman*. *Tachydromus Schreibersii*, *Füz. Cat.*

Brazil.

Fam. V. CHIROCOLIDÆ.

Back and the tail above and below covered with long uniform

keeled scales, placed in rings alternating with each other. Belly and neck with flat shields; collar double; ears none; femoral pores none.

HETERODACTYLUS, Spix. *Chirocolus*, Wagler. Toes 4—5, hinder long, very unequal.

Heterodactylus imbricatus, Spix. Braz. t. 27. f. 1. (not good).

Brazil.

Mus. Zoological Society.

Fam. VI. CHAMÆSAURIDÆ.

Body subcylindrical, elongate, the whole, except the head, covered with rings of elongate keeled scales, forming longitudinal series; limbs rudimentary, ears distinct.

CHAMÆSAURA, Fitz. Feet fin-shaped; nostrils in the lower hinder edge of the nasal shield. Back with six series of broad, and belly and sides with many narrow long keeled scales.

Chamæsaura anguina. *Lacerta anguina*, Linn. *Lac. monodactylus*, Lacép. *Ann. Mus. Hist. Nat.* ii. t. 59. f. 1.

South Africa. Cape of Good Hope.

Fam. VII. HELODERMIDÆ.

The back and sides with oblong convex shield-like scales, the belly with flat, thin, square plates; the head depressed; muzzle rounded; teeth on the inner side of the jaws incurved, with an internal lateral groove; supraorbital plate thin; femoral pores none; tongue —? Legs 4, strong.

HELODERMA, Wiegman. *Trachyderma* Wiegman. *Isis*, 1829.

Heloderma horridum, Wiegman. *Herp. Mex.* t. 1. *Trachyderma horridum*, Wagler *Icon.* t. 18.

Mexico.

Mus. Brit.

D. (Thecaglossæ). Tongue elongate, slender, retractile, apex filiform horny; head with minute polygonal shields; scales placed in rings, those of the sides like those of the back; thighs poreless; supraorbital plates horny; teeth adnate to the inner side of the jaws. Old World. Near water.

Fam. VIII. MONITORIDÆ.

PSAMMOSAURUS, Fitz. Nostrils oval, oblique, near the orbits; tail roundish; scales not pierced; toes rather long.

Psam. Scincus. *Lacerta Scincus*. *Uranus Scincus*, Merrem. *Tupinambus griseus* and *T. Niloticus*, Daud. *Monitor terrestris*, Cuv. *Ouran de Forskal*, Geoffr. *Rept. Egypt.* t. 3. f. 2. t. 4. f. 14, 15.

Young.—Inner side of the neck with 4 brown stripes; tail banded. North Africa. India.

MONITOR. Polydædalus, Wagler. *Uranus*, Fitz. Nostril ob-

long, longitudinal in the middle between the apex of the muzzle and the front angle of the eye ; tail elongate, compressed, with a double edged keel above ; toes elongate, unequal, strong ; teeth rounded.

* *Scales small ; ventral shields small, twice as long as broad.*

Monitor Dracæna. Lacerta Dracæna, Linn. Stello Salveguardia, Laur. Tupinambis Bengalensis and T. Indicus, Daud. 30. and T. Cypedianus, Daud. t. 29. Uvarius guttatus, U. punctatus and U. Argus, Merrem. Monitor gemmatus, Guerin, Icon. t 3. f. 1.

India.

** *Scales moderate ; ventral shields square, as broad as long.*

a. *Scales on the eyebrows equal.*

Monitor Niloticus. Polydædalus, Nilot., Wagler. Lacerta capensis, Sparman ? Tup. ornatus, Daud.

Junior, Tup. elegans and T. stellatus, Daud.

Africa, North, South, and Western.

Monitor capensis. Lac. capensis, Sparman.

Jun. Monitor pulcher, Leach.

South and Western Africa.

b. *With a larger row of scales in the small scales over the eyebrows.*

Monitor heraldicus, Gray, Griffith's Anim. Kingd.

India.

Brit. Mus.

Monitor nebulosus, Gray, Griffith's Anim. Kingd. ix. 27. Dum. and Bib. iii. 433. Tup. neb. Cuv. MSS.

India.

EMPAGUSIA. Nostrils oblong, rather in the front of the muzzle. Tail (shorter than the body and head) tapering, roundish, with a double-edged keel above ; toes short, strong, subequal ; teeth rounded ; scales large.

Empagusia flavescens. Monitor flavescens, Gray, Griffith's Anim. Kingd. ix. 25. Uran. Russelii, Schlegel, MSS. Uran. Piquotii, Dum. and Bib. iii. 483.

India.

Empagusia ocellata. Monitor ocellatus, V. Heyden, Ruppell Atlas, t. Dongola.

Emp. albogularis. Tupinambis albogularis, Daud. iii. 72. t. 32. Monitor Gillii, A. Smith, Zool. Journ. Brown, black-banded, with a black streak on each side of the nape. Nostrils subposterior.

South Africa.

Brit. Mus.

HYDROSAURUS, Wagler. Tupinambis, Fitz. Nostrils near the apex of the muzzle ; teeth compressed, sharp-edged, edge toothed ; tail elongate, with a double-edged keel above ; toes unequal, elongate.

* Scales over the orbits small.

Hydrosaurus varius. Lac. varia, Shaw, Nat. Hist. iv. t. 83. Tup. variegatus, Daud. Hyd. variegatus, Wagler. Uaranus varius, Merrem.

New Holland.

Hydrosaurus marmoratus, Wiegmann, Acta Acad. Nat. Cur. xviii. t. 14. Monitor marmoratus, Cuv. Règ. Anim.

Manilla.

** Scales over the orbits with a series of larger plates.

Hydrosaurus chlorostigmus, Gray, Griffith Anim. Kingd. Dum. and Bib.

India.

Hydrosaurus Gouldii, with two yellow streaks on the sides of the neck; scales over the orbits small, flat.

New Holland.

Hydrosaurus Bellii. Uaranus Bellii, Dum. and Bib. iii. 493. t. 35. f. 1.

Hydrosaurus Timorensis. Monitor Timorensis, Gray, Griffith Anim. Kingd. ix. 36. Tup. viridimaculatus, Daud.

Timor.

Mus. Paris.

Hydrosaurus bivittatus, Wagler. Stellio salvator, Laur. Tup. bivittatus, Kuhl. Uaranus vittatus, Lesson. Monitor elegans, Gray, Zool. Journ. Seba, ii. t. 30. f. 2. cop. Shaw, Zool. t. 66. Monitor Lizard.

Young—*Tupinambis exilis*, Reeve.

India. Java.

ODATRIA, Gray. Nostrils subanterior; teeth compressed, acute; tail round elongate, with rings of keeled subspinose scales, and without any keel along its upper surface.

Odatria punctata. Head, tail, and limbs black (perhaps discoloured), the limbs and base of the tail yellow dotted; body brown, black spotted, beneath yellowish, with darker cross bands. Body and head 8, tail 16 inches long. The ventral shields are long and narrow and perforated behind; the shields of the head are flat, rather unequal; and those over the eyebrows small, rather granular and equal; those of the back are rather small ovate and surrounded with a series of small granules; the toes are rather strong and moderate.

Western Australia, Shark's Bay.

[To be continued.]

XLIV.—*Illustrations of Indian Botany.* By Drs. WIGHT and ARNOTT.

[Continued from p. 306 of the 2nd volume of the Companion to the Botanical Magazine.]

SOLANUM GIGANTEUM.

Plate XIII.

Caule fruticoso aculeato tomentoso, foliis oblongo-lanceolatis acuminatis, supra nudis, subtus niveo-tomentosis, cymis nutantibus parvifloris, corollæ laciniis lanceolatis acutis, baccis globosis nitidissimis.

Solanum giganteum. Jacq. Coll. v. iv. n. 125. Wight et Arn. Cat. n. 1571. Dunal. Sol. p. 202. Ræm. et Sch. v. iv. p. 633.—*Solanum farinosum.* Wall. in Roxb. Fl. Ind. v. ii. p. 255. List of Pl. in E. I. C. Mus. n. 2610.—*Solanum argenteum.* Heyne, Herb. (fide Wall.)

A tall-growing, erect shrub, from 12—15 feet high. Branches rounded, the older ones armed with short, conical, slightly compressed prickles; the younger ones, the petioles, the under surface of the leaves, and the inflorescence clothed with a thick coating of mealy, white stellated, deciduous tomentum. Leaves approximate, oblong-lanceolate, 6 to 8 inches long, by about 2 or 2½ broad, finely acuminate, entire, acute at the base, smooth, dark-green above, except the younger ones, which are tomentose on both sides. Petioles rounded, from ½ an inch to 2 inches long. Cymes lateral, dichotomous, drooping, many-flowered. Calyx small, 5-cleft, the segments ovate, obtuse, scarcely half the length of the corolla. Corolla small, white, 5-cleft; laciniæ spreading, lanceolate. Stamens alternate with the lobes. Anthers projecting. Ovary superior. Style equalling the length of the corolla. Stigma obtuse. Berries round, about the size of a pea, shining as if varnished, containing numerous round flattened seeds.

In alpine districts. Mountains of Dindegul, about 2000 feet above the sea. The specimen here figured was from mountains near Salem; elevation unknown.

Fig. 1, Calyx and pistil; f. 2, corolla laid open, magnified; f. 3, berries, nat. size.

BIBLIOGRAPHICAL NOTICES.

Ichthyologische Bidrag til den Grønlandske Fauna, af Prof. J. Reinhardt. Første Hefte, med otte Kobbere. Kjöbenhavn, 1837, 4to.

THIS valuable work commences with some observations on the Mammalia of Greenland, which is followed by some notes on the Birds,

of which he gives figures of four interesting species, a new *Sylvia* nearly allied to *S. mexicana*, *Fringilla leucophrys*, *Numenius hudsonicus*, Lath., 1. *N. borealis*, Wilson, and *Anas Barrowii* of Richardson. Then follows a list of the Greenland Fish, accompanied with numerous observations, and with the description of two new genera, which he thus characterizes :

LYCODES.

Corpus elongatum, antice incrassatum, rostro obtuse conico, trunco compresso, cauda ensiformi. *Squamæ* corporis rotundæ, minutæ, tenuissimæ, cuti immersæ. *Os* dentibus validis, intermaxillaribus, mandibularibus, vomerinis et palatinis armatum; rictus mediocris. *Membrana branchiostega* sexradiata utrinque jugulo connata, apertura branchiali angusta postica. *Pinnæ ventrales* obsoletæ brevissimæ latiusculæ jugulares. *Pinna dorsalis* et *pinna analis* longissimæ, apicem caudæ circumdantes; radiis articulatis divis. *Vesica natatoria* nulla.

Inter *Zoarcæum* et *Anarrhicam* genus medium.

1. *Lycodes Vahlîi*. Corpore fasciato, capite postice parum depresso; pinnis, dorsali et anali, squamis minutissimis adpersis, illa radiis 117, hac radiis 93; ano ante medium gastræum sito. (Tab. V.)

Pustulated Blenny, *Pennant, Artic. Zool.*—*Blennius polaris, Sabine.*

2. *Lycodes reticulatus*, corpore reticulato; capite postice compressiusculo; pinnis, dorsali analique, nudis, illa radiis 95, hac radiis 75; ano fere in gastræo medio sito. (Tab. VI.)

3. *Lycodes seminudus*, corpore concolore, ab apice oris usque ad angulum anteriorem pinnæ analis nudo; capite postice compressiusculo; pinnis dorsali analique nudis, illa radiis 91, hac 71; ano pone medium gastræum sito.

BYTHITES.

Corpus breve compressum antice incrassatum, ore fere truncato, cauda ensiformi. *Squamæ* corporis rotundæ minutæ imbricatæ. *Linea lateralis* tubulis exsertis cutaneis compacta, interrupta. *Os* dentibus acutis intermaxillaribus, mandibularibus, vomerinis et palatinis armatum; rictus mediocris. *Membrana branchiostega* utriusque aperturæ invicem connata sub isthmo libere suspensa; radiis octo; apertura ampla infero-postica. *Pinnæ ventrales* obsoletæ uniradiatæ filiformes longiusculæ jugulares. *Pinnæ, dorsalis* et *analis*, longæ, apicem caudæ circumdantes; radiis articulatis divis. *Membrum* conicum crassum pone anum horizontaliter porrectum, apice triphylo papilligero. *Vesica natatoria* canali pneumatico nullo.

Bythites fuscus. (Tab. VII.)

Ordnance Survey of Ireland. Colonel Colby, R.E. Superintendent. Volume the First, Memoir of the City and North-western Liberties of Londonderry, parish of Templemerc. 4to. Dublin. Hodges and Smith. 1837.

We have always considered that a survey of a country, conducted

by properly appointed men, whether its real purport was mere history and statistics, or the ascertaining of the valuation and capabilities of the district for culture and commerce, might also be made most highly important for a knowledge of its natural productions; and from the clear manner in which the contents of the present volume (the first of a series) are made out, with the elaborate detail given to some of the departments, we ventured to expect something of a superior class, and that some portion of the work would come fittingly under our head of 'Bibliographical Notices.' The volume is divided into three *parts* or *sections*, the "*Natural*," "*Artificial*" and "*General*" *Notes*. It is with the first we have to do, divided again into

Natural Features and Natural History.

| | |
|-------------|----------|
| Hills. | Geology. |
| Lakes. | Botany. |
| Rivers, &c. | Zoology. |

With this part we are not satisfied. The parish of Templemere is not a very favourable one for displaying the qualifications of a naturalist or for exhibiting what might be done in the records of a local Fauna; the plan pursued is excellent, but it is sadly deficient in detail. We have the "natural features," embracing geology and botany, concisely described, giving a view of the general surface and of the vegetation of the parish. Its botanical riches are not great, not more than fifty species being mentioned as worthy of notice, but some of these would be actively sought after by a botanist accustomed only to the more usual flora of England or Scotland. For zoology the parish is noted to be unfavourable, and undoubtedly it is for a rare or very interesting list; but surely in mammalia Templemere can boast of more than a bat and the otter. The latter is given as the *Lutra vulgaris*; is it the species common to the Sister isle and the continent of Europe? Seventeen birds are only mentioned, all of them common, if we except one, which, however, we are at some loss to identify, from the remarks which accompany it. No. 11, "*Sturnus ? vulgaris*, or *Turdus solitarius*;" if the true solitary thrush, as it is called (a *Petro cincla*), then it is worth recording; if merely a young starling, scarcely so; and Mr. Thompson, of Belfast, or Mr. R. Ball could have at once settled that question, if a reference to the "Ordnance Collections" was inconvenient. The fish are better treated of, though we have only twenty-two species recorded. There are some interesting observations on the genus *Scyllium*. The list of *Mollusca* enumerates only *Mya arenaria*, *Turbo littoreus*, and *Mytilus edulis*. In this first part, occupying in all only sixteen

pages, it is stated in conclusion, "that the details will be filled up and completed in the zoological department of the county;" and on this account we should not perhaps have spoken so lightly of it, but we know that there are so many parts of Ireland unexplored that we do feel disappointed. A naturalist should be attached to the survey during all its working and travelling time; the expense would be comparatively small, the information would be great, and without this we can scarcely expect to see the "natural state" brought up to the same standard with the other portions of this great and national undertaking.

At the conclusion of this volume there is appended "Notices," accompanied with plates; these are very important. The Notices are stated to be "published for the more speedy information of men of science, in anticipation of the parochial memoirs, in proper connexion with which the subjects will be ultimately described," and the plates devoted to organic remains and to botany are beautifully executed. This plan is also excellent, and might perhaps be made to supersede entirely any temporary sketch of the natural state of each parish, such as we have just noticed, until the natural history of the whole county was prepared. They might also be so introduced as to form a separate work, detailing the most interesting discoveries among the natural productions of Ireland when the great survey was completed, and thus be more useful and easily accessible to the professed naturalist.

Many of these notices have appeared elsewhere previously, and are chiefly relative to botany and the lower classes of zoology. The plates are three, devoted to fossil remains, the others to *Calamagrostis lapponica*, *Carex Buxbaumii*, *Polysiphonia atropurpurea*, and *P. affinis*.

The Edinburgh New Philosophical Journal. Conducted by Professor Jameson. No. for January 1838. Edinburgh, A. Black and Co. 8vo.

JANUARY 1838. *Zoology.*

I. *Experiments on the development and growth of the fry of the Salmon, from the exclusion of the ovum to the age of seven months.* By Mr. John Shaw, Dumlunry, Dumfriesshire. This is one of the most important papers on the subject which has been published since 1800; and although circumstances wherein any animal is to a certain extent artificially placed must be viewed with caution, the experiments now detailed are nearly as perfect as, under the circumstances, they could be. Mr. Shaw was previously known

to have performed some experiments to ascertain the range of the growth of the young salmon after its exclusion from the egg, and those now described were begun after these trials, and prior experience, had brought the whole arrangement tolerably perfect.

Mr. Shaw had made a series of small artificial ponds, having a run of pure water passing through them; and the lead bottoms gravelled so as to resemble as near as possible the native spawning beds, and the resort of the young fry after they were hatched. Two salmon were taken from their spawning-bed in the frith while just ready to deposit their spawn; these were made immediately to shed their spawn together, in a pool formed for the purpose by the side of the river, and the impregnated ova were afterwards removed to Mr. Shaw's breeding pond. There it was hatched 101 days after impregnation; and at the age of six months, or in the November following (the time when his paper was read), the young had attained the length of about three inches. From these results Mr. Shaw considers that the young or fry do not proceed to the sea in the same year they are hatched, as has been generally supposed, but that they remain in the fresh water over the first winter, and migrate about the May following, or when about twelve or thirteen months old. The fry or young salmon have hitherto been supposed to migrate to the sea the same spring in which they were hatched from the egg; and if it shall be hereafter proved that they do not leave the rivers for thirteen or fourteen months, it is evident that an immense destruction must take place during their continuance in the fresh water, a circumstance of great importance to the fisheries.

Botany.

I. *On the Tree which produces the Gamboge of Commerce.* By R. Wright. (Extracted from the Madras Journal.) Together with explanatory notes by Dr. Grohm. The paper in the Madras Journal is written after reading Dr. Grohm's papers in the Companion to the Botanical Magazine, and evidently to a certain extent misunderstanding the latter author, from having not seen all the accounts which had been published in this country. Dr. Grohm corrects and explains his own observations, in the remarks which accompany the Madras extract; but nothing new has been elicited since we formerly noticed the subject.—II. *On Algae which communicate a red colour to the waters of some salt marshes.* By M. Dunal. In several of the Continental salt-works the crystals were often observed to be of a beautiful rose colour, or the water to have a ferruginous orange tint, at the edges of which was also observed a scum of the

same colour. This was thought to be caused by a small "Branchiopode," *Artemia salina*. The examinations of M. Dunal found however that this little animal, though abounding, was perfectly colourless, or rather white than red; and continued observation has shown him that the colouring matter proceeded from a minute *Protococcus*, to which he has applied the name of *salinus*. The orange red again, or rosy colour, he found produced by another plant, to which the name of *Hæmatococcus salinus* has been applied; but at the same time, he observes, that the *Protococcus* may turn out to be only the young state of the other. Among the "Scientific Intelligence" is recorded the discovery of *Carex leporina*, Linn., Loch-Nagar, by Mr. Dickie, of Aberdeen.

Works in the Press.

A History of the British Zoophytes. By George Johnston, M.D.,
Fellow of the Royal College of Surgeons of Edinburgh, &c.

THE object of the present work is to describe every species of this interesting class of animals ascertained to inhabit the British Islands. The first part of the volume is devoted to the history of zoophytology, and to details on the structure, physiology, and classification of zoophytes; and the second contains the description of the species.

We are perfectly convinced, that this volume will not only be an acceptable one to scientific naturalists, but to all those who, through various channels, have heard of the discoveries relating to this class of beings in the memoirs of Trembley, Baker, and Ellis. The work of Ellis on the British Corallines, published in the year 1755, has been long out of print, and is now extremely rare. But the present author, with a complete knowledge of everything that has been previously written on the subject, has given correct details regarding all the species hitherto discovered from personal observation; and his known talents leave it little doubtful that this work will in future be a standard one in all that regards the Natural History of British Zoophytes.

Since the publication of Ellis's Essay on Corallines in 1755, no separate work has appeared in illustration of the history of British zoophytes. In the mean time, a much more accurate knowledge of the structure and habits of these remarkable productions has been attained, and many curious species have been discovered in our seas, the notices of which lie scattered through numerous volumes of a miscellaneous nature, often very difficult to procure, and not attainable without considerable expense. To collect into one volume, of

a convenient size and moderate price, these discoveries ; to systematise the whole ; and arrange the species after a more natural method, has been the object of the author of the present work. In the plates, figures, of the natural size and magnified, of nearly every species, are given,—the figures drawn from nature expressly for the volume ; and from the care bestowed upon them it is confidently believed that they will be found accurate and faithful representations of their objects.

This work will be published in a form so as to range with Yarrell's British Birds and Fishes, and will be accompanied with numerous wood cuts and engravings.

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

October 10, 1837, R. Owen, Esq., in the Chair.—Mr. Gould called the attention of the Meeting to a collection of Birds from Australia and the adjacent islands, belonging to the Raptorial Order, and upon which he proceeded to offer the following observations.

“ My attention during the last few days having been directed to the Raptorial Birds of Australia and the adjacent islands, and my own collection from those parts being particularly rich in the birds of this order, I am induced to lay before the Society a slight sketch of all the species found in that portion of the globe, and to exhibit to the Meeting a few which I conceive to be now for the first time made public. From our limited knowledge, however, of this vast continent, my observations will more particularly refer to the birds of the southern parts of Australia and Van Diemen's Land, these being the districts which up to the present time have been most extensively explored.

“ Most of the forms now exhibited will be found to bear a striking resemblance to those inhabiting Europe ; indeed, the similarity is so strikingly obvious as to leave no doubt of the influence of temperature on the form of animals.

“ A remarkable deficiency, and that a very important one, is the total absence of any of the *Vulturidæ*, or of any form by which this family might be represented. It is true that a bird has been described by Dr. Latham under the name of ‘ New Holland Vulture ; ’ but this bird is now almost universally admitted to belong to a totally different order, that of the *Rasores*. I have placed an example of this singular species on the table, an examination of which will enable any member present (who has not before had an opportunity of

inspecting it,) to judge of the impropriety of assigning it a place among the *Raptores*. The nearest approach to the *Vulturidæ*, said to be from New Zealand, and brought from thence by Captain Cook, is the *Polyborus Nova-Zelandiæ*, the *Falco Nova-Zelandiæ* of Dr. Latham: now as I conceive that the specimen brought home by Captain Cook will prove to be identical with those so frequently transmitted from the Straits of Magellan, as I am not aware of any other specimen except Captain Cook's having been received direct from New Zealand, and, moreover, that the form is strictly confined to America and its adjacent islands, some mistake may have arisen in labelling the specimen brought home by our celebrated navigator, a circumstance which, if my opinion be correct, has involved the history of the species in considerable confusion.

"Of the genus *Aquila* only one species has as yet been discovered, viz., the *Aquila fucosa* of Cuvier, which doubtless represents in Australia the Golden Eagle of Europe, from which it may be readily distinguished by its more slender contour, and by its lengthened and wedge-shaped tail.

"Of the genus *Haliaëtus* or Sea Eagles, there are four species, the largest of which, clearly the analogue of the European *H. albicilla*, is one of the species which I consider to be new, and which from the wedge-shaped form of its tail I would characterise as *H. spheonurus*. I cannot but consider the form of the tail in this species as particularly interesting, inasmuch as it is a character peculiar to all the species of Eagle inhabiting Australia, although in a less degree to the others than to the present species. The second is a small species, described by Messrs. Vigors and Horsfield in the Linnæan Transactions as *Hal. canorus*, the European representatives of which are not so clear to me as those just alluded to. The third is the *Haliaëtus Calei* of Messrs. Vigors and Horsfield, of which a single specimen exists in the collection of the Linnæan Society, and which I should be rather inclined to assign to the genus *Astur* than to that of *Haliaëtus*. In size this species equals the Common Buzzard, but has the rounded wing and several other characters peculiar to the genus *Astur*. The fourth is the White-breasted Eagle of Dr. Latham, a species inhabiting the continent of Australia and Van Diemen's Land. At a cursory glance this powerful bird might be said to represent the *Haliaëtus leucocephalus* of northern Europe and America; and although I cannot but admit their resemblance, I discern characters sufficiently distinct to warrant its separation into a new genus. I am not, however, prepared to make this division at the present moment; still I am of opinion this bird will prove to be one of a group

ranging between *Haliaëtus* and *Pandion*, of which latter genus the Osprey of Europe may be regarded as the type, and of which a single species inhabits Australia. This bird appears to accord most accurately with European specimens excepting in its smaller size; and if this should ultimately prove to be identical with our bird, it may then be said to be universally distributed over the Old World. The Osprey of America, on the contrary, presents us with some slight differences, which being constant, may I think be safely regarded as specific.

“ Of the genus *Falco*, the *Peregrinus* is replaced by a species most nearly allied to, and hitherto considered identical with that bird: the experienced eye of the ornithologist will, however, readily distinguish an Australian specimen when placed among others from various parts of the globe, so that there will be but little impropriety in assigning to it a separate specific name. As, however, my engagements have not allowed me to make that minute examination which is necessary to determine the point, I defer for the present affixing a new specific name for this species. The Hobby, so familiar as a European bird, is represented by the Falcon, for which I now propose the specific name of *rufiventer*, as I believe it to be undescribed. The third species, which I have provisionally followed Messrs. Vigors and Horsfield in placing among the true Falcons, is the *Falco Berigora*, whose lengthened and slightly-formed tarsi indicate a difference in structure, which may ultimately prove to be generic. The *Cerchnis cenchroides* (*Falco cenchroides* of Messrs. Vigors and Horsfield,) exhibits a beautiful analogy with the Common Kestrel of our island, but although nearly allied possesses several important and permanent differences.

“ The great variety of changes to which the members of the genus *Astur* are subjected, has led to vast confusion, and it is only by a minute examination of the numerous examples in my collection in various stages of plumage, that I have been able to determine the species with satisfaction to myself; and if I have found it necessary to consider as identical two or three species of this genus characterised by Messrs. Vigors and Horsfield, I feel confident that it was owing to the absence of sufficient materials at the time the Linnæan collection was so ably named by those gentlemen, that they were described as distinct.

“ My attention has of course been directed to the great difference in size which exists between the males and females, and the various changes from youth to maturity which occur in the members of the genera *Astur* and *Accipiter*; and I must now call the attention of

the members present to the beautiful analogy which exists between the *Accipiter torquatus* and the *Astur approximans* of Messrs. Vigors and Horsfield, of which several examples are on the table; I say analogy, because it is in colour alone that so great a similarity exists between them. These gentlemen having applied the names of *approximans* and *fasciatus* to two birds which I believe to be synonymous with the *Falco radiatus* of Dr. Latham, whose description was taken from a young bird, I retain the name of *Astur approximans* in preference to *radiatus*, from the near approach of these two birds to *Accipiter torquatus*. It will, perhaps, not be out of place to say a few words on the difference in structure of these birds, which in outward appearance offer so close a resemblance to each other. The females in both these minor groups far exceed the males in size, and both groups appear with a trifling deviation to be subject to the same changes of plumage; while in their structure they exhibit considerable differences, the chief of which are the more delicate, slender, and lengthened form of the legs of *Accipiter*, the great prolongation of the middle toe, and the square or forked form of the tail. On comparison it will be found that the centre toe of the little male *Accipiter* on the table is fully as long as that of the male *Astur approximans*, a bird nearly double its size; that the tarsi in the latter bird are comparatively shorter and more robust; and that the middle tail-feathers are the longest, giving a rounded form to that organ.

"It may be truly said that Australia abounds in anomalies, witness its Black Swan and White Hawk, which latter bird has not a little puzzled me, and I am not yet satisfied as to whether it be not a permanent albino variety of another species, examples of which are now on the table with a corresponding number of birds in the white plumage. Much difference will be found in their size, but this may be readily accounted for, by the difference of size in the two sexes.

"The males and females of the white birds agree so accurately in their measurements with those in the grey plumage, as to induce me to believe that they are identical; and after a close examination I am also led to consider the *Astur Raii* of the Linnæan Catalogue as the young of the same species.

"Of the genus *Milvus* my collection contains two species, and two more beautiful representatives of the two species inhabiting Europe cannot be imagined; for one of these, whose affinities ally it closely to the Common Kite of England, I would propose the name of *Milvus Novæ-Hollandiæ*; and for the other, which is equally allied to the *Milvus ater*, that of *M. aterrimus*.

"The bird which has hitherto been considered as identical with the

Elanus melanopterus of Africa, is evidently distinct from that species; an unerring difference may be found in the jet black spot on the white part of the under surface of the wing; for this hitherto undescribed species I would propose the name of *notatus*.

"One species of Harrier only, but a very interesting one, inasmuch as it represents there the *Circus rufus* of Europe, has come into my possession. I believe the female of this species to be the *Circus affinis* of Messrs. Jardine and Selby; but as the male has not yet been characterised, and moreover differs very much from the female, to which alone the name of *affinis* would apply, I propose to drop that appellation and to give that of *Jardinei* instead.

"On examining the family of *Strigida* or Owls, we cannot but observe the deficiency which exists in some of the subgenera, and the abundance of others; thus while we have never seen any birds belonging to the genera *Bubo*, *Otus*, *Scops*, &c., we have numerous species of the restricted genera *Strix* and *Noctua*: the name of *Noctua*, however, having been applied by Linnæus to one of the tribes in Entomology, ought not perhaps to be adopted; that of *Athene*, proposed by M. Boje, and employed by some German naturalists, may be used in its stead.

"Four species of this genus are now on the table, the two largest of which are new to science. For the largest I would propose the name of *Athene strenua*, and for the other that of *A. fortis*. The third has been characterised by Messrs. Vigors and Horsfield as the *Noctua Boobook*, and the *Noctua maculata* of these gentlemen seems to be identical with it. For the fourth and last species of the genus, which is from Van Diemen's Land, and which is evidently distinct from either, I propose the name of *leucopsis*, from the white colouring of its face. The species of the genus *Strix* which I have called *delicatus*, together with my *Strix cyclops* and *Strix castanops* and the *Strix personata* of Messrs. Vigors and Horsfield, may be said to be closely allied, but distinct species.

"In conclusion, it may be remarked that the birds belonging to the Raptorial Order inhabiting Australia and the adjacent islands are extremely few in number, when compared with those found in other countries; at the same time, as our knowledge of this part of the world is very limited, the number will in all probability be considerably increased as these countries become more fully known to us.

"At present the species are twenty-six in number, and are distributed as follows.

- 1 True Eagle . . . *Aquila*.
- 4 Sea Eagles . . . *Haliaëtus*.

- 1 Osprey *Pandion*.
- 4 Falcons *Falco*.
- 3 Hawks *Astur* and *Accipiter*.
- 3 Kites 2 *Milvus* and 1 *Elanus*.
- 1 New form allied to *Pernis*.
- 1 Harrier *Circus*.
- 8 Owls *Strix* and *Noctua* or *Athene*.'

BOTANICAL SOCIETY OF EDINBURGH.

February 8th, 1838.—Professor Graham, President, in the Chair.

A letter from Dr. Tyacke was read, containing an account of a botanical excursion in the spring of 1837 to the Channel Islands and the coast of France, with remarks on several of the species collected.

Observations by Dr. Graham on Plants collected in Scotland in 1837 by Dr. M'Nab were read. He noticed particularly the following :

Arenaria norvegica, first seen on Serpentine Hills to the northward of Balta Sound, Shetland, by a son of Dr. Edmonstone, and afterwards found by Dr. M'Nab in the same place. Specimens collected by Dr. Pollexfen in 1835, were shown to the Society.

Cerastium latifolium, var. With dense cæspitose habit, orbicular leaves, profusely glandular pubescence, and straight cylindrical capsule, scarcely longer than the calyx. *Hab.* Shetland.

Lychnis dioica, var. With pale rose-coloured flowers, and stem rarely three inches high. Seen by Mr. James M'Nab some years ago, and found to retain its peculiar habit in cultivation. *Hab.* Near Newton Stewart, Galloway.

Agrostis canina, var. is perhaps *Trichodium alpinum* or *rupestre*. Dr. Graham thinks the absence of the inner valve of the perianth, though not a generic, is a good specific character. Plant first noticed by Dr. Graham in Sutherlandshire some years ago, and afterwards by Mr. Wm. M'Nab in a viviparous state in the same county. *Hab.* On the top of Goatfel, Arran.

Fedia mixta, Vahl. Specimens were gathered along with this, showing the transition from *F. dentata*. *Hab.* Near Whithorn.

Mr. R. Falconer read a paper containing an account of the most celebrated gardens of antiquity, with observations on the hortulan taste which they exhibit. After some introductory remarks upon the probable origin of gardens, he proceeded to give a detailed account of the gardens of Alcinous mentioned by Homer; the Hanging Gardens of Babylon; the parks or gardens of the Persians mentioned by Xenophon; the gardens of Daphne in Syria, and the gardens of the Hesperides. He then gave an account of the gardens celebrated by the ancient Greeks and Romans; among the latter those of Lucullus

at Baïæ, of Pliny at Tusculum, and Laurentum. Mr. Falconer considers, that although a taste for gardening evidently prevailed to some extent among the ancients, yet that it never attained to any perfection except among modern nations. Flowers he also believes never constituted a peculiar feature of ancient gardens, and that they were not esteemed as objects of taste by the ancients, who appear to have cultivated them only as decorations to be employed on occasions of public and private rejoicing.

Mr. James Macaulay then read a paper, the object of which was to prove that flowers were esteemed by the ancients as objects of taste, and cultivated as a source of amusement. He argued that the very fact of flowers being deemed worthy of being offered to the gods proved a previous taste and value for them; and gave examples of gardens among the ancient Hebrews, Greeks, and Oriental nations, where *amœnitas*, and not *utilitas* alone, must have been the object in the cultivation of flowers. He next alluded to the gardens mentioned in the Latin classics, and contended that the garden of Lucullus, so often referred to, ought not to be regarded as a specimen either of the art or the taste of his time, as it was censured by his own contemporaries Cicero and Varro, the latter expressly stating "*Hortos Luculli non floribus fructibusque sed tabulis fuisse insignes.*" He also showed, on the authority of Horace, Martial, and Pliny, that the citizens of Rome used to cultivate plants in the balconies of their houses, and to rear flowers in boxes and in flower-pots, which were called "*Horti imaginarii*;" and that it is not likely the rich would do this merely to procure materials for their votive offerings, or to supply the ornaments for their entertainments; but that a taste for their cultivation as objects of amusement must also have prevailed.

Dr. Graham read the continuation of his observations on the plants collected in Scotland in 1837, by Dr. M'Nab.

Erythræa littoralis. Dr. Graham thinks it doubtful whether there is more than one British species of *Erythræa*; and if the present is to be considered distinct, that its only character would seem to rest on the narrow linear segments of the 5-partite calyx, equal to the tube of the corolla.—*Hab.* Brodick, Arran.

Lathyrus maritimus is apparently the plant of the North of Europe, of Canada, and of the United States as far south as Boston; and may be easily distinguished from *L. pisiformis* of Ledebour, or the figure of Gmelin quoted by him and in Hooker's British Flora, by the winged stem and the shape of the stipules. The variety which Dr. Graham considers to be the type of the species is distinguished by its compact robust growth, and by the common petioles being much arched backwards; whereas the present plant is of a slender

somewhat straggling habit, not from growing in wooded ground, but probably from being the inhabitant of the less genial climate to which the species is extended. It appears not to differ from *Lathyrus venosus* of American botanists. *Hab.* Sands on the shore at Barra Firth, Unst, Shetland, where Dr. Edmonstone had observed it for several years.

Ervum tetraspermum and *Allium arenarium*.—*Hab.* Near Kirkcudbright.

Cladium Mariscus.—*Hab.* Ravenston Loch, Whithorn.

Lamium intermedium.—*Hab.* Shetland.

Mr. Campbell read a communication from Col. P. J. Brown of Eichenbühl near Thun, containing a sketch of the botany of the neighbourhood of the lake of Thun, Switzerland, chiefly in reference to the geographical distribution and altitude of the species enumerated. The lake of Thun having an elevation of about 1900 feet above the sea, and the surrounding country being much intersected by hills or long ridges, the vegetation assumes a subalpine character on the pastures about 1800 feet above the lake, comprising *Trollius europæus*, *Hieracium aureum*, *Tussilago alpina*, &c. The following is given as an approximation to the species usually met with at different altitudes on the surrounding mountains. Between 2000 and 3000 feet, *Arenaria verna* and *ciliata*, *Dryas octopetala*, *Cotoneaster vulgaris*, *Hieracium villosum*, &c. Between 3000 and 4000 feet, *Silene acaulis*, *Cerastium alpinum*, *Phaca astragalina*, *Oxytropis uralensis*, *Saxifraga oppositifolia*, *Hieracium aurantiacum*, *Arbutus alpina*, *Ajuga alpina*, *Orchis pallens*, *Carex atrata*, &c. Above 4000 feet, *Gnaphalium alpinum* and *Leontopodium*, *Petrocallis pyrenaica*, *Draba tomentosa* and *stellata*, *Androsace bryoides*, &c. Col. Brown concludes his paper by stating that he hopes to be able to communicate fuller information as to the precise elevations of the different localities mentioned on some future occasion.

ROYAL ASIATIC SOCIETY.

April 21.—Professor Wilson in the Chair.

Dr. Royle read a communication from Colonel Sykes, respecting the ~~metable~~ and other productions of the Deccan, having reference to a similar communication at the beginning of the year, showing their immense extent in the eastern continent and adjacent peninsula, which yet remained to be made subservient to the arts and manufactures of this country. The paper was accompanied by a great variety of specimens and an extensive herbarium. These he divided into the gummy, the astringent, the fibrous, the oil-producing, and the saponaceous and dyeing, being classified according to their uses in the arts. The caoutchouc, belonging to the first class, was be-

coming daily of greater importance; its production was almost illimitable, and there had been a preparing manufactory lately established at Calcutta. The plants yielding astringent productions were also very numerous, and some importance must be attached to this class, as the supply of European barks must, at no distant day, diminish to such a degree as to call the attention of those interested to the subject. The oil-producing plants were very numerous, and India had been looked to as a country from which we may justly calculate upon for supplies. The sapoline principle was developed in many of the specimens, similar to that of the soap-plant of the West Indies; it was now beginning to be usefully applied in washing silk. Several flaxes and silks were also on the table; but before a proper account can be given as to their merits, they will require to be prepared. Dr. Caüter read a paper on a zoological collection, consisting principally of molluscæ and zoophytes, which he exhibited, and were collected by him on the coasts of Sunberdunds. The phosphorescent changes of colour in the ocean caused by these animals he described as rivalling in beauty those of the cameleon.

LINNEAN SOCIETY.

May 24.—This day, the anniversary of the birth-day of Linnæus, and that appointed in the charter for the election of Council and Officers, the Right Rev. the Bishop of Norwich, President of the Society, opened the business of the meeting, and in stating the number of Fellows whom the Society had lost during the past year, gave the following notices of some of them.

James Agar, Esq., died at the advanced age of 81. He was the last surviving member of a society established in London for the cultivation of natural history, which preceded the foundation of the Linnean Society, and which reckoned among its members John Hunter, Hudson, and Curtis. Mr. Agar became a Fellow of this Society in 1826, and in his capacity of trustee transferred to it the books and other property which had belonged to the Natural History Society.

William Bentham, Esq.

Thomas Castle, M.D.—This gentleman was the author of some elementary works on Botany and Anatomy.

The Rev. John Horatio Dickenson.

Sir William Elford, Bart., F.R.S.—Sir William Elford was an Honorary Member of the Royal Academy, and was up to a late period of life, which was prolonged beyond 80, in the habit of adding to the exhibitions at Somerset House some of his own paintings, which were regarded by competent judges as evincing great merit.

The branch of natural history to which he was more particularly devoted was ornithology.

John Hey, Esq.—An eminent surgeon at Leeds.

George Hibbert, Esq., F.R.S.—Mr. Hibbert was a distinguished patron of botany, and long possessed a botanic garden richly stored with the choicest plants at Clapham, and for the purpose of enriching his collection he sent to the Cape of Good Hope Mr. Niven, an indefatigable botanical collector, by whose means he introduced from that quarter into our gardens a great number of plants until then unknown. Mr. Hibbert's name is commemorated in a genus of the *Dilleniaceæ*, and the name of Mr. Niven has been commemorated in a genus of *Proteaceæ* by Mr. Brown in the 10th volume of the Society's Transactions. The herbarium formed at the Cape by Mr. Niven was presented by Mr. Hibbert to this Society.

Sir Richard Colt Hoare, Bart., F.R.S.—The news of the death of this excellent man at the age of 80 reached town a few days ago. He was more particularly distinguished as an antiquarian and for his taste and patronage of the fine arts. The history of his native county, Wiltshire, rich in ancient British remains, occupied a large share of his attention during his long life, and the splendid works which he has published on that subject evince great learning, combined with deep research and patient industry. Sir Richard possessed a very extensive library, particularly rich in antiquarian lore, at his splendid seat at Stourhead, where the man of science and learning was sure to meet with a hospitable welcome. Botany also occupied a portion of his attention. His garden was long famed for the extensive collection of the *Geraniaceæ* which it contained, the culture of which he himself superintended, and his name is commemorated in a genus of that family. Sir Richard was distinguished for his urbanity and benevolence, and his loss will be severely felt in the extensive agricultural district in which he resided.

The Rev. Thomas Poole Hooper, M.A.

Sir Abraham Hume, Bart., F.R.S.—Sir Abraham Hume was a munificent patron of botany, and was the possessor of a choice collection of plants, more especially of those from China and the East Indies, which he cultivated with great success at his seat at Wormleybury. He likewise possessed a very valuable mineralogical collection, which was particularly rich in precious stones, and which had been arranged and named by the Comte de Bournon, author of the *Traité de Mineralogie*.

Sir Abraham Hume reached the advanced age of 89, and his love of natural history, especially of botany, continued unabated to the last, a circumstance which doubtless tended to prolong that

cheerfulness and amiability of disposition for which he was distinguished.

Thomas Andrew Knight, Esq., F.R.S., President of the Horticultural Society.—One of the most original, ingenious, and eminent of vegetable physiologists, and distinguished equally as a horticulturist. He had been a member of this society for thirty-one years, but only contributed two papers to its Transactions, one on the Variegation of Plants in 1808, and the other on the different species of esculent Strawberries in 1817.

The important results of Mr. Knight's labours are to be found in the Transactions of the Royal Society and in those of the Horticultural Society, and in the gardens and orchards of this country. It is to be regretted that his papers scattered through the extensive volumes of these Societies have never been collected and published in a more accessible form; for however speculative many of the opinions and views of the physiologist are, the facts elicited by the ingenious experiments of Mr. Knight must always be valuable, and his reputation has perhaps never been duly appreciated out of his own country. His labours were directed not only to the advancement of vegetable physiology, but to useful practical results; and in the interesting labours of the garden, orchard, and forest, the practical man has found sagacious and useful explanations and directions in the writings of Mr. Knight for his guidance.

It would be impossible to do justice to his memory in the brief notice of our deceased members that is usual on this occasion. The best tribute to his worth is the universal regret that his death, in his 80th year, has excited, and the respect in which he is spoken of, and the feeling that prevails of the hopelessness of finding any one to supply the vacancy he has made in the ranks of science. Whether we regard him as the intimate friend and associate of the venerable Banks, Sir J. E. Smith, and others who have gone from amongst us, as the persevering and ingenious investigator of the laws of nature, or as the enlightened and benevolent country-gentleman like Evelyn, devoting his means, his talents, and leisure to the good of his country, or as the kind landlord endeared to a large and happy tenantry, he is equally an object of our admiration and respect; and I have the less regret at my inability to render the honour that is due to his memory, because I am assured that a life so excellent cannot close without a due tribute to it being paid by some one who is capable of detailing its labours and holding it up to the imitation of others.

Peter Rainier, Esq.

Matthias A. Robinson, Esq.

Sir John Deas Thomson, K.C.H., F.R.S.

Sir Patrick Walker, F.R.S., Edinb.—Sir Patrick was a zealous entomologist, and possessed the most extensive entomological collection in Scotland.

Mr. William Wykes.

Among the Foreign Members is *Godfrey Reinhold Treviranus, M.D., of Bremen*.—It would be impossible for me to attempt to give even a brief outline of the career of this distinguished anatomist and physiologist, of whom it is perhaps enough to say that he was the intimate friend and fellow-labourer of Tiedemann.

Among the associates are *Mr. Thomas Milne*, who was a zealous practical botanist and a contributor to the 'English Botany'. On his authority the *Cardamine bellidifolia* has been received into the British Flora.

Nathaniel John Winch, Esq.—A very zealous British botanist, but his name stands more immediately connected with the Flora of Northumberland and Durham, of which he published, in 1807, the *Botanist's Guide*, in 2 vols., and subsequently an *Essay on the Geographical Distribution of the Plants of those counties*, as well as remarks on their Distribution in connexion with the Geological Structure of the Soil. He was also the author of a paper on the Geology of the Banks of the Tweed, which appeared in the volume of the Transactions of the Natural History Society of Newcastle-upon-Tyne, of which he was one of the founders and an active member.

At the election which subsequently took place, the Lord Bishop of Norwich was re-elected President; Edward Forster, Esq., Treasurer; Francis Boott, M.D., Secretary; and Mr. Richard Taylor, Under Secretary. The following five gentlemen were elected into the Council in the room of others going out: viz. Arthur Aikin, Esq.; John Jos. Bennett, Esq.; George Bentham, Esq.; the Earl of Derby; and John Guillemand, Esq.

MISCELLANEOUS.

DESCRIPTION OF A THIRD LIVING SPECIES OF THE CRINOIDEA, FORMING THE TYPE OF THE NEW GENUS *HOLOPUS*. BY M. D'ORBIGNY.

This new species was discovered by M. Rang at the Antilles: it is distinguished from all the other genera of the Crinoidea by two distinct characters; first, that which has obtained for it the name of *Holopus*, and which consists in its having the foot entire, not divided, a character possessed by none of the known genera; second, that of also having the foot short, hollow, and serving as a receptacle for the viscera, which is not the case in the other Crinoids, which, on the contrary, have a peculiar dilatation for this purpose si-

tuated at the summit of the foot. M. d'Orbigny gives the following characters to the new genus which he establishes: "Animal fixed to the soil by a root taking the form of the solid bodies to which it is attached; from this root or base proceeds a foot or entire body, short, thick, hollow, containing the viscera, and opening into a mouth, which at the same time performs the functions of the anus, placed at the bottom of an irregular cavity, formed by the union of dense dichotomous arms, which are porous, exteriorly convex, and grooved interiorly, divided into numerous articulations, and longitudinally armed alternately with small conical very compressed branches."—*Annal. Scien. Nat.*, Feb. 1837.

THE GIGANTIC JAPANESE SALAMANDER.

The attention of the continental naturalists appears to have been at length attracted by the fine gigantic salamander, which was discovered in Japan by Dr. Siebold, and which has been lying for several years in the yard of the Leyden Museum. Professor Van der Hoeven has lately given some detail of its anatomy, and has shown that it is as nearly allied in osteological character as it is in external appearance to the American genus *Menopoma* of Harlan, though his detail shows that Prince Charles Bonaparte was quite correct (when he exhibited the drawing of the specimens at the Zoological Society in the latter part of last year) in forming for it a new genus, which he proposed to call *Sieboldia*, after its discoverer. For according to the account of Van der Hoeven it has no lateral opening on the sides of the neck, which is so distinct in the *Menopoma*.—J. E. GRAY.

ZOOTICA VIVIPARA.

Desmarest, Daudin, and the other French naturalists are quite agreed as to this lizard, which is widely dispersed over Europe, being oviparous; and that the ova are deposited at the foot of walls, &c. exposed to the sun. In Scotland the animal is ovo-viviparous, as I have repeatedly ascertained from the possession of specimens which have bred in my possession in 1827, 1828, and 1829. One of these, caught 19th June 1829, brought forth on the 27th July nine young in all. They were excluded inclosed in membranous sacs. The young were of a blackish brown colour when alive, and very active. For want of proper food they all died within a fortnight. The mother of this brood was fed with flies. After October she only crawled out of her hiding place in mild days and during sunshine. She was still alive at Christmas lying coiled up among the moss in the box in which she was kept. She died however some time during the severity of the winter.—J. Stork.

DESCRIPTION OF A NEW SPECIES OF VOLUTA.

Voluta Norrissii.—Greyish white, very minutely black, dotted with broad black wavy irregular longitudinal streaks, with three bands with paler dots and streaks; nucleus blunt, upper part slightly crenated; last whorl subangular; mouth bright orange, with a white edge to the outer lip. Inhab. —? Cabinet, Mr. Norris.

Very like *Voluta nervosa*, but the shell is minutely black dotted, the longitudinal streaks are broader, and the three dark bands are rather more towards the front of the shell; the hinder one occupies the whole of the spine and hinder slope of the last whorl.—J. E. GRAY.

GIGANTIC ECHINUS SPINE.

There has lately been discovered in Sicily the fragment of a gigantic spine of an *Echinus*, nearly an inch and half in circumference and more than eight inches long.—J. E. GRAY.

CURTIS'S BRITISH ENTOMOLOGY.

The 15th volume of this splendid work commenced with a beautiful plate of *Stauropis Fagi* with its grotesque caterpillar. *Nitidula Colon*, *Ledra aurita*, and *Myopa fulvipes* follow; a figure of *Orchestes Waltoni*, a new species of the saltatorial Curculios, has enabled the author to record some facts respecting the destructive œconomy of these minute beetles. *Acrolepia Betulella*, an undescribed *Tinea*, *Crabro subpunctatus*, and *Hydræssa pygmæa*, a pretty little insect allied to *Velia*, complete the two first numbers.

Those for March and April contain *Dermestes lardarius*, *Lithomia Solidaginis*, a fine *Noctua* new to Britain, with its caterpillar; *Prostemma guttula* from an unique British specimen taken near Sandwich; the rare *Tetyra fuliginosa*, *Trachys minuta*, *Porrectaria albicosta*, *Cynips nervosa*, belonging to the tribe of Gall-nut flies, and *Trigonometopus frontalis*, a remarkable fly established as a genus by Macquart.

Nos. 173 and 174 exhibit *Otiorhynchus maurus*, with some remarks on the great mischief committed by various species of the genus on fruit trees, &c. *Siona dealbata*, an elegant moth, having very much the appearance of a white butterfly. *Tenthredo cingulata*; this is a figure of an hemaphrodite specimen, in which the different colours of the two sexes are strikingly contrasted in the body; *Capsus hirtus*, *Elatér aterrimus*, *Alucita hexadactyla*, a strong variety of *Panorpa germanica*, and *Phasia speciosa*, for the first time figured and recorded as an indigenous species.

Of the 24 plants, which are as highly finished and as faithfully depicted as the insects, we were most struck with the figure of the wood strawberry (pl. 690.) and amongst the rare or local species

we observed *Orchis tephrosanthos*, *Curum verticillatum*, *Villarsia Nymphoides*, *Saxifraga oppositifolia*, *Lepidium latifolium*, *Tamarix gallica*, *Petroselinum segetum*, *Inula Helenium*, and *Allium arenarium*.

OBITUARY.

Died, at his house in Ridley Place, Newcastle, on the 5th of May, aged 69, Nathaniel John Winch, Esq., greatly respected. Mr. Winch was well known in the scientific world as an excellent British botanist. He was author of "An Essay on the Geographical Distribution of Plants through the Counties of Northumberland, Cumberland, and Durham," which has passed through two editions; also "Observations on the Geology of Northumberland and Durham, 4to., 1814," and of a very elaborate "Flora of Northumberland and Durham," printed in the Transactions of the Natural History Society of Northumberland, Durham, and Newcastle upon Tyne. He has bequeathed the whole of his very extensive Herbarium and his Library of Natural History to the Linnæan Society, of which he was a member, and has left a legacy of £200 to the Newcastle Infirmary, to which he acted as Secretary for a period of 21 years. He for many years maintained an active correspondence with several of the most scientific men in all parts of the world; and their letters, carefully arranged, present an interesting feature in his library.

METEOROLOGICAL OBSERVATIONS FOR JUNE 1838.

Chiswick.—May 1. Fine: rain: fine at night. 2, 3. Very fine. 4. Dry haze. 5. Thunder: fine. 6. Slight haze: very fine. 7, 8. Very fine. 9. Hot and very dry. 10. Cold and dry. 11, 12. Fine. 13. Hazy: fine. 14. Cloudy and cold. 15—18. Fine. 19. Overcast. 20. Slight rain. 21. Cloudy. 22, 23. Cloudy: rain. 24. Overcast. 25—27. Fine. 28. Rain. 29, 30. Fine. 31. Very fine: heavy thunder-showers at night.

Boston.—May 1. Cloudy: heavy rain P.M. 2. Cloudy. 3. Cloudy: thunder, lightning, and rain early A.M. 4, 5. Fine. 6. Cloudy. 7—12. Fine. 13. Cloudy: rain early A.M.: rain P.M. 14. Cloudy: rain early A.M. 15—17. Fine. 18—19. Cloudy. 20. Cloudy: rain P.M. 21. Cloudy. 22. Cloudy: rain A.M. 23. Rain. 24, 25. Cloudy. 26, 27. Fine. 28. Fine: rain P.M. 29. Cloudy. 30. Cloudy: rain P.M. 31. Cloudy.

Applegarth Manse, Dumfries-shire.—May 1. Sun shone: hoar frost A.M.: cold P.M. 2. Sun shone: genial rain afternoon. 3. Sun shone, showery A.M. 4. Sun shone: moist and mild: genial. 5. Sun shone: a beautiful day. 6. Sun shone: very dry and parching. 7. Sun shone: warm and genial. 8. Sun shone: very warm and clear. 9. Sun shone: the same. 10. easterly wind: cool. 11. Sun shone: milder than preceding day. 12. Sun shone: a few drops of rain P.M. 13. Sun shone: withering day. 14. Sun shone: cold, with hail showers. 15. Sun shone: clear and cold. 16. Sun shone: heavy hail showers. 17. Sun shone: cold and showery. 18. Sun shone: cold and withering. 19. Cold and very wet. 20. Heavy rain all day. 21. Sun shone: showery and mild. 22. Mild and very wet. 23. Sun shone: moist: rather cold. 24. Sun shone: clear growing day. 25. Sun shone: mild and clear. 26. Sun shone: clear and warm. 27. Dull and withering. 28. Sun shone: clear and warmish. 29. Soft air: wet all day. 30. Sun shone: warm and growing. 31. Sun shone: mild with showers.

*Meteorological Observations made at the Apartments of the Royal Society by the Assistant Secretary, Mr. ROBERTSON; by Mr. THOMPSON at the Garden
o the Horticultural Society at Chiswick, near London; by Mr. VENABLE at Boston, and by Mr. DUNBAR at Applegarth Manse, Dumfries-shire.*

| Days of Month. 1888. | Barometer. | | | | Thermometer. | | | | | | Wind. | | | | Rain. | | | Dew- point. Land : 9 a.m. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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ANNALS OF NATURAL HISTORY.

XLV.—*Further remarks on the British Shrews, including the distinguishing Characters of two Species previously confounded.* By the Rev. LEONARD JENYNS, M.A., F.L.S., &c.

IN a paper published in 1837 in the ‘Magazine of Zoology and Botany,’* I endeavoured to prove that the *Sorex Araneus* and the *S. fodiens* of English authors were not respectively identical with the two species so called on the continent. The former I referred to the *S. tetragonurus* of Hermann; and I added the descriptions of what I considered to be two remarkable varieties of that species, which I represented as very variable in its characters. Further attention to the subject has, however, convinced me of an error with regard to one of these supposed varieties, which I am anxious to correct. I allude to the large specimens, found in marshy districts, described as *var. 1* in that paper, of which I have since obtained individuals of all ages, and in sufficient number to establish beyond a doubt that they are perfectly distinct from the smaller, though hardly perhaps more common, species, which is found in many situations, and which seems to be the one most generally, if not exclusively alluded to, in the works of British zoologists.

It will be my object in this paper, *first*, to point out the distinguishing characters of these two shrews; *secondly*, to make some remarks upon their nomenclature, which will require correction, as well as upon the nomenclature of *S. fodiens* and *S. remifer*; and *thirdly*, to give a synoptic view of all the species of *Sorex* hitherto met with in Great Britain, with their essential characters and principal synonyms, so far as these last can be determined. I conceive that this synopsis, which will include the characters of the genus, as well as those of its subordinate divisions, will not be unacceptable to those

* Vol. ii. p. 24.

naturalists who interest themselves with our native Fauna, and who may wish to know what our present knowledge of the species of this puzzling group amounts to.

The *square-tailed shrew*, by which name I designate the larger of the two species above alluded to, differs from the *common shrew* of English authors, not only in its *superior size*, but in the characters of the *snout*, *feet*, and *tail*, and to a less extent in the *dentition* and *colours*. It may be thought that some of these characters are not to be depended on after what I myself have stated on this subject in a former paper. But it must be remembered that, though variable, the variations are in some measure due to age; and that, if we can obtain individuals of different ages, we may at once know what allowance to make for this circumstance. Also, although the same character may in some cases vary in different individuals of the same age, yet it still varies within limits, and by examining a number of specimens we may obtain an average which will be tolerably constant in a given species. Thus with regard to the *relative size* of these two species, I find the average length of the *square-tailed shrew* (measured from the extremity of the snout to the anus) to be about two inches and three quarters, individuals being occasionally met with that exceed three inches; whereas the average length of the *common shrew* is hardly two inches and a half, nor did I ever meet with a specimen that was more than two inches and eight lines. Hence the *maximum* size attained by the latter species is hardly equal to the *average* size of the former. The characters of the *snout* depend in some measure upon age. I have noticed in my former paper, that this part is more attenuated in old than in young specimens; at least it appears so, from the circumstance of its not increasing much in breadth as the animal grows. But it will be at once manifest, on comparing individuals of the same size, that in the *square-tailed shrew* the snout is much broader, more swollen at the sides, and more obtuse at the extremity than in the *common shrew*. In the former species the distance between the eyes is contained barely once and a half in the distance from the eyes to the end of the snout. In the latter it is contained twice in the same. The *feet* are also obviously different in the two species. Those of the *square-*

tailed shrew, the fore feet especially, are broad and strong as if formed for digging ; whereas those of the *common shrew* are comparatively weak and slender, and much less adapted for that purpose. The *tail*, notwithstanding the changes induced in it by age and other circumstances, also offers good distinguishing characters. Its average length appears to be greatest in the *common shrew*, although this species is, in all other respects, smaller than the other. It is also stouter in this species, nearly cylindrical, and of more uniform thickness, the end terminating abruptly ; better clothed with hair at all ages, the hair standing very much out, especially in young specimens, and though extending at the extremity beyond the bone to the distance of a line or more, seldom converging into a point to form a pencil. In the *square-tailed shrew*, as its name indicates, the tail is more decidedly quadrangular at all ages. It is also slenderer, and slightly tapering at the tip ; the hair not so long or copious as in the *common shrew*, and never standing out, but, on the contrary, closely appressed in young specimens, and forming at the extremity a short but fine pencil. As age advances, the hair in this species often becomes so much worn, as to leave the tail nearly or quite naked, without any pencil, and with the angles at the sides extremely obvious. The only differences in the *dentition* of these two shrews are to be seen in the relative size and position of the lateral incisors. In the *square-tailed shrew*, the first and second of these teeth in the upper jaw are nearly equal ; so likewise are the third and fourth ; but the former two are obviously larger than the latter two : the fifth is much smaller than any of the preceding ones, very inconspicuous, and generally set a little within the line of the others, so as to be not readily seen from without. In the *common shrew*, the first four of these incisors diminish in size more gradually, and form a more regular series ; the fifth is also larger in relation to the others, more in the line, and more obvious externally. The *colours* of these two species are not very dissimilar ; but they appear to be less variable, and generally somewhat darker, in the *square-tailed* than in the *common shrew*. The back, in the former, is not so obviously tinged with reddish ; and I alluded in my previous paper to an appearance of three colours, occupying respect-

ively the back, sides, and abdomen, which I have noticed in most of the specimens that have fallen under my observation. I need only add, indeed, to what is there stated, that the upper and under surfaces of the tail are like those of the body, but more reddish, with a tolerably well-marked line of separation at the sides : occasionally, however, the tail is of a uniform reddish brown above and below. The snout is always black at the extremity. In the *common shrew*, a rufous or yellowish tinge more or less pervades the whole of the body ; and the feet as well as the under parts of the snout (even to the tip) and tail are often testaceous.

In addition to the above differences, which are founded upon external characters, I may notice a marked dissimilarity in the *cranium*, which is broader and much more depressed in the *square-tailed* than in the *common* species, and with the profile or chaffron rather more arched.

Having pointed out the distinguishing characters of these two shrews, it becomes necessary to speak, in the next place, of their nomenclature. The larger of the two I have already designated by the name of *square-tailed*, not only because the title is extremely applicable, but because I believe this species to be the true *S. tetragonurus* of Hermann and Duvernoy. It is also decidedly identical with two specimens brought from Germany last summer by Mr. Ogilby, to one of which the name of *tetragonurus* is attached. But at the same time I feel some doubts whether it be the *S. tetragonurus* of Geoffroy and of other authors. With regard to the smaller of the two species, or that which I have called above *common shrew*, I find it impossible to identify it with complete certainty with any of those described by continental naturalists. In fact there are but two species belonging to this division of the genus *Sorex* (exclusive of the *S. fodiens* of Duvernoy), the characters of which, so far as I know, have been given in sufficient detail to enable them to be recognised. These are the *S. tetragonurus* and the *S. constrictus* of authors. The former (at least as described by Duvernoy) I have already considered to be the same as the *square-tailed* shrew of this paper. The latter, which was also established by Hermann, Duvernoy considers as the young of *S. fodiens* ; but this cannot be said of the *S.*

constrictus of Geoffroy, which is evidently distinct, and which appears in many of its characters, especially its size and the form of the cranium, to resemble the *square-tailed shrew* of this paper, or Hermann's *S. tetragonurus*; whilst, on the other hand, the *S. tetragonurus* of Geoffroy, I think may possibly be the same as my *common shrew*. That the name of *tetragonurus* has been thus applied by Hermann and Geoffroy to two distinct species, though Geoffroy did not confound the species themselves, is further probable from the circumstance, that the *S. cunicularius* of Bechstein, which seems closely to approach the *square-tailed shrew* of this country, Duvernoy considers as synonymous with the *S. tetragonurus* of Hermann, whilst Geoffroy regards it to be the same as his *constrictus*. It is useless looking to any of the later systematic authors with the view of solving this question, as none of them have added anything in their descriptions of the above species from their own observation. And it appears to me that the only step to be taken is to impose a new name on the *common shrew* of this country, reserving the name of *tetragonurus* for the *square-tailed shrew* of this paper, which I believe to be the true *tetragonurus* of Hermann and Duvernoy. It is not at all improbable that the former may be the *S. constrictus* of some authors, but it appears to me a more preferable step to run the hazard of increasing its synonymy, than of adding to the confusion which exists at present by giving it a name, which may one day be proved to have been applied in some cases to a distinct species. The name which I propose for it is that of *S. rusticus*.

Before I proceed to the synopsis of British shrews with which I propose to conclude this paper, I may say a few words with reference to the nomenclature of *S. fodiens* and *S. remifer* of this country. I stated in a previous memoir that the former was not the *S. fodiens* of Duvernoy, and judging from the characters of the teeth which he assigns to his species, I see no ground for revoking that opinion. But further investigation has led me to believe that it is the real *S. fodiens* of Gmelin, as well as of Bechstein, Brehm, and Wagler. I find also, in confirmation of this latter point, that in a second memoir on the shrews read by Duvernoy to the Strasburg Na-

tural History Society in January last*, he assigns the same dentition to the *S. fodiens* of Gmelin as he assigns to that subdivision of the genus *Sorex*, to which our own species undoubtedly belongs. He has also considered the *S. fodiens* of Gmelin as synonymous with the *S. carinatus* of Hermann.

With regard to the *S. remifer* of English naturalists, I have only to observe that it appears to be so very much smaller than the *S. remifer* of Geoffroy, that I can hardly believe it to be the same as that species. And whether it be or be not, the name first imposed on it by Sowerby having the precedence, it will be more proper that in accordance with that author it should be called *S. ciliatus*.

Synopsis of British Shrews.

SOREX, Linn.

* Two middle incisors much produced; the upper ones curved, with a spur behind more or less prolonged; the lower ones almost horizontal; lateral incisors or false grinders, small, $\frac{3-5}{2} : \frac{3-5}{2} \dagger$; true grinders $\frac{4}{3} : \frac{4}{3}$; fur short and soft; snout attenuated; tail long.

1. AMPHISOREX ‡, Duv.

Middle incisors in the lower jaw with the edge denticulated; the upper ones forked, the spur behind being prolonged to a level with the point in front; the lateral incisors which follow in the upper jaw 5 in number, and diminishing gradually in

* For an abstract of this paper see L'Institut, No. 226. p. 111.

† None of the *British* species yet discovered have less than four lateral incisors above on each side.

‡ This group was denominated by M. Duvernoy in his first memoir *Hydrosorex*; but having discovered that it did not include the *S. fodiens*, Gmel., a species pre-eminently aquatic, he has since transferred the name of *Hydrosorex* to the next group, to which this species apparently belongs.

Of Duvernoy's first subordinate group (*Sorex*, Duv.) no species has been as yet detected in Great Britain. It may be useful, nevertheless, to annex its characters, which may assist in determining any which may chance to be met with.

Middle incisors in the lower jaw with an entire or simple edge; the upper ones notched, or with the spur appearing as a point behind; the lateral incisors which follow in the upper jaw three or four in number, and diminishing rapidly in size from the first to the last; none of the teeth coloured.

According to Duvernoy this group comprises all the extra-European species, besides two (*S. Araneus*, Geoff., and *S. leucodon*, Herm.) which are met with on the continent.

size from the first to the last ; all the teeth more or less coloured at their tips.

Sp. 1. *S. rusticus*, Jen. (Common Shrew.) Snout and feet slender: tail moderately stout, nearly cylindrical, not attenuated at the tip, well clothed with hairs, which are very divergent in the young state, and never closely appressed.

S. Araneus, Man. Brit. Vert. p. 17.—*S. tetragonurus*, Geoff. Ann. Mus. xvii. p. 177. pl. 2. f. 3 ?—Fetid Shrew, Penn. Brit. Zool. i. p. 125.—Common Shrew, Bell. Brit. Quad. p. 109.

Hab. Appears principally to frequent dry situations ; gardens, hedge-banks, &c.

Var. β. *S. Hibernicus*, Jen. (Irish Shrew.)

I am indebted to Mr. R. Ball, of Dublin, for a specimen of the common shrew of Ireland, which I believe to be a distinct species ; but as I have seen only one individual, I shall not at present consider it as more than a variety of the *S. rusticus*. It differs principally in its smaller size (although evidently an *old* individual) ; in its more uniform colours, the under parts being similar to the upper, only somewhat paler ; and in the form of the tail, which is not so stout or so long as in the common English shrew, and rather more tapering at the extremity. The hairs on the tail are short and very much worn, the apical half of the tail being nearly naked, and consequently without any pencil at the tip. The teeth are so much worn down that their original characters can hardly be ascertained ; but the lateral incisors above appear more crowded, or set closer together, than in the English shrew. The feet and ears are similar ; the snout not materially different, but the distance from its extremity to the ear a little longer in proportion ; this, however, may possibly be due to age. The following are the exact dimensions of this specimen :

| | inch. line. | |
|-------------------------------|-------------|----|
| Length of head and body..... | 2 | 1 |
| ———— head | 0 | 9½ |
| ———— tail | 1 | 3½ |
| ———— hind foot..... | 0 | 5½ |
| ———— fore foot | 0 | 3½ |
| ———— ears..... | 0 | 1½ |
| From ear to eye | 0 | 3½ |
| ———— to end of the snout..... | 0 | 8 |

Sp. 2. *S. tetragonurus*, Herm. (Square-tailed Shrew). Snout broader than in the last species : feet, fore especially,

much larger: tail slender, more quadrangular at all ages, and slightly attenuated at the tip; clothed with closely-appressed hairs in the young state, in age nearly naked.

S. tetragonurus, Duvern. in *Mém. de la Soc. d'Hist. Nat. de Strasb.* ii. Liv. 1. p. 19. pl. 1. f. 2.—*S. cunicularius*, Bechst. *Naturgesch. Deutsch.* i. p. 879. pl. 10. f. 2. (?)—*S. constrictus*, Geoff. *Ann. du Mus.* xvii. p. 178. (?)—*S. Araneus*, var. 1. *Mag. of Zool. and Bot.* ii. p. 37*.

Hab. More attached to marshy districts than the last species, though not confined to them.

Var. β.—*S. castaneus*, Jen. (chestnut shrew).—*S. Araneus*, var. 2. *Mag. of Zool. and Bot.* ii. p. 39.

Hab. Found in marshes with the preceding.

Not having been able to procure any more specimens of this shrew, I shall still consider it as a mere variety of the *S. tetragonurus*, though a closer investigation of its characters has led me strongly to suspect that it will one day be found to constitute a distinct species. And in that case, the name which I have given it above, derived from its peculiar colour, might be adopted for it. The dimensions and distinguishing characters of both sexes will be found in the 'Magazine of Zoology and Botany,' as already quoted. In addition, however, to what is there stated, I may notice a slight difference in the *cranium*, which is broader posteriorly and rather more elevated in the crown than that of the *S. tetragonurus*, thus accounting for the "fulness about the head" alluded to in my first description of this variety. It is also slightly longer, and these superior dimensions are even observable when compared with those of the *cranium* of an aged specimen of *S. tetragonurus*, of which the entire length exceeded by more than half an inch that of the variety in question. The form of the *snout* is not very different in these two shrews, but it is rather more attenuated at the extreme tip in the *chestnut* than in the *square-tailed shrew*. The dentition also is much the same.

2. HYDROSOREX†, Duv.

Middle incisors in the lower jaw with an entire edge; the upper ones notched, or with the spur appearing as a point be-

* Perhaps to this species is to be referred the large shrew mentioned in Loudon's *Magazine of Natural History*, vol. iii. p. 471, met with in a clover-field, which the writer was unable to identify with either of our then known British species.

† Denominated in M. Duvernoy's first memoir by the name of *AMPHISOREX*.

hind; the lateral incisors which follow in the upper jaw four in number; the first two equal, the third somewhat smaller, the fourth rudimentary; the tips of all the teeth a little coloured.

Sp. 3. *S. fodiens*, Gmel. (*Water Shrew*). Deep brownish-black above, nearly white beneath, the two colours distinctly separated on the sides: feet and tail ciliated with white hairs.

S. fodiens, Gmel. i. p. 113. Bechst. *Naturgesch. Deutsch.* i. p. 872. pl. 10. f. 1. Brehm, in *Bul. des Sci. Nat.* (1827) xi. p. 287. *Man. Brit. Vert.* p. 18.—*S. bicolor*, Shaw, *Nat. Misc.* ii. pl. 55.—*Crossopus fodiens*, Wagler, in *Isis*, 1832 (fid. Duv.).—*Water shrew*, Penn. *Brit. Zool.* i. p. 126. Bell, *Brit. Quad.* p. 115.

Hab. Marshes and banks of ditches; but it is occasionally met with at a distance from water.

Obs. Montagu has recorded an individual which had the throat and breast pale ferruginous*. Fleming, in his description of this species†, states that there is a black spot in the middle of the throat, with a line of the same colour along the middle of the belly; also that the tail is nearly white at the tip. Whether these variations of colour be merely accidental, or dependent upon sex or season, or whether characteristic of any allied species confounded with the above, remains yet to be determined. Montagu's specimen was a male; so likewise was one mentioned by a writer in Loudon's Magazine of Natural History‡, in which the throat is said to have been of a deep chestnut. But nothing of this colour was observable in any of the specimens I have met with in Cambridgeshire, of which at least two have been males taken during the summer months. Neither have I ever seen the markings spoken of by Fleming; but they are noticed by Bechstein in his description of this species. Also the writer in Loudon's Magazine, above alluded to, states that a week after the capture of the male with the chestnut-coloured throat, a female was taken, in which the throat was grayish. Both these last were caught in a cellar during winter; and I am inclined to suspect that they were the sexes of a species possibly distinct from the one more commonly met with, in which the under parts, with the exception of a triangular dusky spot on the vent, are nearly pure white.

* Linn. Trans. vii. 276.

† Brit. An. p. 8.

‡ Vol. iii. p. 471.

Sp. 4. *S. ciliatus*, Sow. (*Ciliated Shrew*.) Black above, greyish black beneath; throat yellowish ash: feet and tail strongly ciliated with greyish hairs.

S. ciliatus, Sow. *Brit. Misc. pl.* 49.—*S. remifer*, Yarr. in *Loud. Mag. Nat. Hist.* v. p. 598. *Man. Brit. Vert.* p. 18.—Oared shrew, *Bell. Brit. Quad.* p. 119.

Hab. Found in the same situations as the preceding.

Note.—Before concluding it may be well to apprise those naturalists who may be led by Duvernoy's memoirs, or by either of my own, to examine the dentition of our native shrews, that attention must be paid to the age of the individual before determining the true characters of the teeth in any species. It is only in adult middle-aged specimens that they can be safely trusted. In the young always, and occasionally in the very old, the teeth have an ambiguous appearance, which might easily mislead a hasty observer. In the instance of the former, this ambiguity arises from the circumstance of the teeth not showing themselves at first, but being covered over with the periosteum, which is common to them and the bone in which they are implanted*, and which is not thrown off till after the individual has considerably advanced in growth, and so far assumed all its other characters as to appear mature. Also this skin is not cast off all at once, but will be found still investing the smaller teeth after that the larger and more pointed ones are protruded. In a specimen of the *S. tetragonurus*, which measured 2 inches 2 lines in length, exclusive of the tail, and which, until the teeth had been examined more closely, was never suspected to be immature, the molars and the middle incisors were found prominent, whilst all the lateral incisors were still concealed by the periosteum, so as to present the appearance of one continuous bone or tooth, with a sharp edge, filling the entire space between the

* There are some peculiarities connected with the first-formation of the teeth in the shrews, for the details of which I must refer the reader to Duvernoy's first memoir on these animals. I shall simply observe here, that the teeth do not receive their first development within the osseous portion of the jaw to be afterwards gradually evolved, as in the case of other Mammalia, but are found from the period of birth in the exact places they are to occupy in after-life, being simply enveloped by the periosteum of the bone to which they are attached. From this and other circumstances, Duvernoy infers that in these animals there are no milk-teeth to be succeeded by a second set at the season of maturity.

middle incisors and the first molar. In a young individual of the *S. leucodon* (brought from Germany by Mr. Ogilby), in which species the first lateral incisor is very much larger, in relation to the following ones, than in any of those met with in our own country, this tooth, in addition to the middle incisors and the molars, was found prominent, whilst the second and third lateral incisors were still concealed. This individual was sufficiently grown to have attained the length of $2\frac{1}{2}$ inches, and so little did it wear any appearance of immaturity, that the characters of the teeth might at first have been considered as indicating a peculiar type of dentition quite distinct from that which belongs to the adult animal. It was not till the investing periosteum had been removed with the point of a needle that the anomaly was explained.

In the case of *very old* specimens, the teeth lose much of their true character, in consequence of the attrition to which they become subjected by long use. In one individual of the *S. tetragonurus*, in my possession, the alteration from this circumstance is very considerable. The upper middle incisors are positively ground down to beyond the point of bifurcation, so as to have entirely lost all appearance of their original typical form: the edge of the lower incisors has become entire, the denticulations being quite effaced, and no trace of colouring (which is generally confined to the tips of the teeth) anywhere remains*.

Swaffham Bulbeck, June 8, 1838.

* [It may be well to direct the author's attention, as well as that of the reader, to a very valuable memoir lately published in Wiegmann's Archiv, (Part I. for 1838) on the European shrews, by H. Nathusius. In this paper, which is only the first and *historical* part, the author carefully reviews the various works and memoirs on this interesting family, and thus notices Mr. Jenyns's first memoir published in the second volume of the Magazine of Zoology and Botany: "The most recent paper with which I am acquainted is a very excellent memoir, by Jenyns, on the British shrews. In this Duvernoy's incorrect statement respecting the dentition of the *Hydrosorida* has unfortunately caused a new error. Jenyns fully proves that *S. Araneus* of all English authors is not the species described by Daubenton, but the *S. tetragonurus*, *Herm.*, and considers it probable that Linnæus was acquainted with this species, which, from Swedish specimens and Linnæus's first statement, now appears to me to be no longer at all doubtful. *S. Araneus* is stated hitherto never to have been seen in England. Respecting the British water shrew, Jenyns is however in error, as, following Duvernoy's description, he considers it to be different from the one of the continent; he therefore, with Shaw, names it *S. bicolor*. From his good description, however, it is evident that they do not differ from one another."

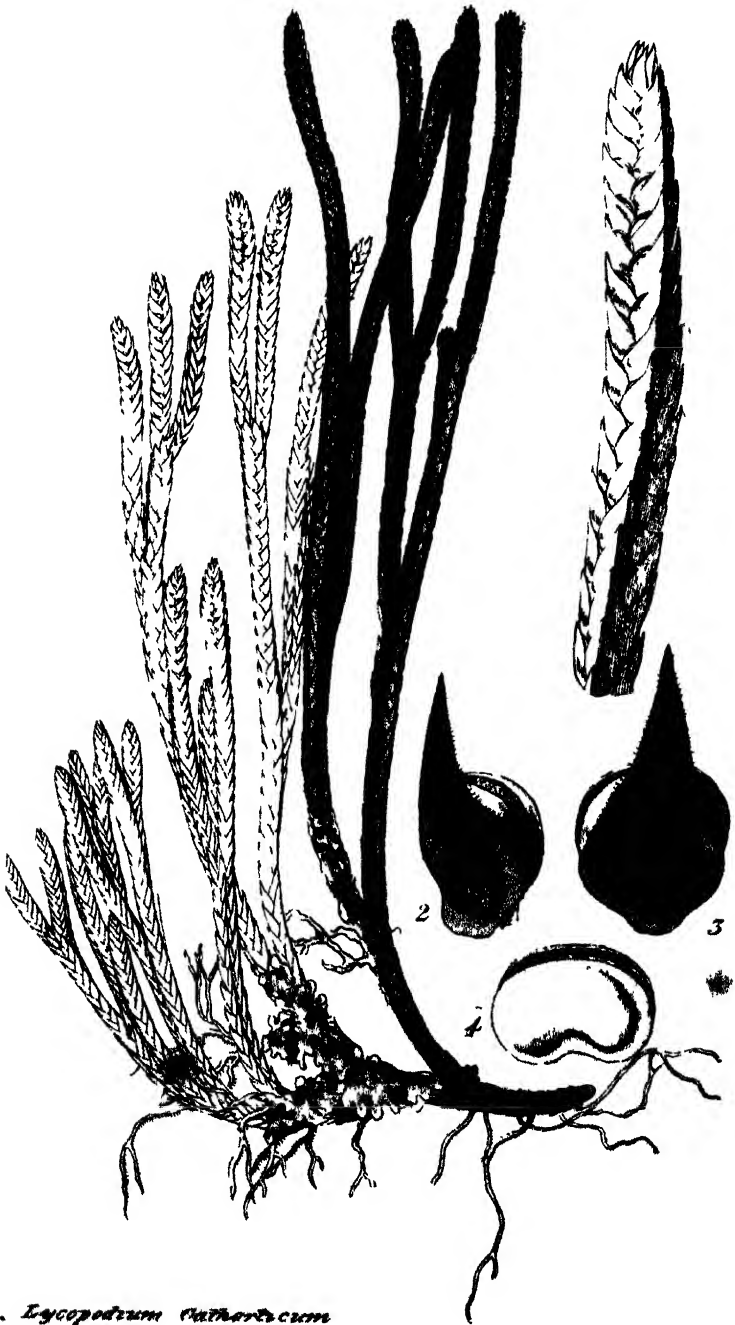
The author, after going through the history of this family, has carefully arranged the numerous synonyms in chronological order.—EDIT.]

XLVI.—On the “*Jatun condenado*” (*Lycopodium catharticum*), an efficacious remedy for the Leprosy among the Indians of Columbia. By Sir WM. J. HOOKER.

[With a Plate.]

SPECIES of the genus *Lycopodium* exist in almost every part of the world, from the equator to the extreme arctic regions, and from the level of the sea to a height on the Andes approaching to the limit of perpetual snow. No less than 200 species are enumerated in the fullest list that has yet been published*, and many new ones exist, yet undescribed, in our Herbaria. All are, I believe, capable of affording a blue dye; but not more than one, so far as I know, has been found to possess any remarkable or valuable properties. I allude to the *Lycopodium clavatum*, or common club-moss of Europe, which has been celebrated for ages, and perhaps not undeservedly, for its various uses, insomuch that upon the continent it is a well-known article of commerce. The best general account we have of it is that given in the ‘Nouveau Dictionnaire des Sciences Naturelles,’ where we learn that “the whole plant possesses peculiar qualities, but is most celebrated for the yellowish inflammable and detonating dust, which even resembles gunpowder in the two latter respects, and is afforded by its capsules in an immense quantity. This substance is largely collected, and applied to different purposes, being known by the vulgar name of *vegetable brimstone* or *lycopode*. A pinch of it, when cast upon any burning matter, takes flame instantly, darting forth a blaze which almost immediately disappears, and without leaving any perceptible odour. It is this singular property which has caused the lycopode to be employed on the stage to represent lightning, infernal flames, &c., as well as in the preparation of fire-works. Its consumption is so great as to render it a rather lucrative object of commerce in Switzerland and Germany, where this vegetable powder is principally collected, and where it is often adulterated with the staminal dust of the fir-cones, which, however, possesses none of its qualities. Towards the close of summer, during autumn, and the commencement of winter, the spikes

* See Hooker and Greville, ‘Enumeratio Filicum,’ in Bot. Misc., vol. ii. p. 360, and vol. iii. p. 104.



Lycopodium catharticum

of this *Lycopodium* appear, and diffuse the lycopode contained in their capsules. They are cut off and carried home to be dried in boxes or sieves prepared for the purpose, and being shaken from time to time, the powder drops out, when it is collected, and, after being anew dried, is fit for sale.

“In pharmacy this dust is used to roll up boluses and pills, the result being to cover them with a foreign substance, which preserves them unaltered. In fact, so completely does the lycopode coat the surface of pills, that they may be put into water and taken out again without being moistened, an experiment which may be still more satisfactorily made by putting one’s hand into water into which lycopode has been thrown, when the hand will come out dry. The adherence of these minute seeds to one another is doubtless the cause of this phenomenon.

“This plant is administered in decoction as a diuretic, also for the relief of gout and the destruction of vermin. The powder is considered to be antispasmodic, and is drunk in white wine to cure dysentery and scurvy. Formerly it was used in pulmonary complaints, whence it obtained the name of *Pulmonaria*, as it did that of *Plicaria* from being employed in the north, principally in Sweden and Poland, for the cure of the *plica*, a malady in which the hair becomes endowed with sensation, and is mingled and matted together in a living mass. The effect of the lycopode in this latter dire disease was, by preventing the mutual contact of the hairs, to hinder their adherence.”

Of late years, and especially in this country, I believe that as a medicine the *Lycopodium clavatum* has not maintained its reputation, from a probably mistaken notion that its virtues in the cure of scorbutic diseases have been greatly overrated. But when it is known that the Indians of Columbia in South America, guided by experience alone,—for they never can have heard of the properties of our European *Lycopodium*,—have discovered a remedy for the most lamentable of cutaneous complaints in a species of the same genus, growing in their own country, we cannot but deem the subject deserving the attention of the physicians of the old world; and it may be worth the while to subject to fresh tests the real virtues of our

common club-moss (*Lycopodium clavatum*), and to ascertain how far some of our other native species may be endowed with similar qualities. Three or four kinds are extremely frequent on the mountains of Scotland and the north of England. It should be ascertained too whether the active principles, if any, reside in the foliage or in the seeds or spikes.

My attention was first called to the South American *Lycopodium* by William Turner, Esq., our late Minister at Bogota, where he most obligingly devoted some of the time which could be spared from his more important duties to collecting seeds and specimens of the vegetable productions of that extremely rich botanical region, and which he has communicated to me. Among those which arrived in the early part of this year are fine specimens of the plant in question, and which I soon discovered to be a new and very handsome species of *Lycopodium*, as the subjoined figure will show. They were accompanied with the following note: "Plants of '*el Jatun condenado*,' which in the Inga language means the *great devil*: this is another plant found in Asuay of the equator, and whose medicinal virtues are only hitherto known to the Indians. It has been discovered that it proves a remedy much more efficacious than the *Cugchimchullo** against leprosy; and it is stated that in fifteen days it cured a lady to whom an Indian administered it from gratitude, and who had not received relief from any other medicine."

Shortly after, my valued friend Professor Wm. Jameson sent me a collection of plants from Pillzhum, including specimens of this very *Lycopodium*, with the remark, "From the mountains of Pillzhum;—it operates in a small dose as a violent purgative. It has been administered as a remedy against elephantiasis, and is known by the name of *Jatun condenado*. From the violence of its operation it requires caution."

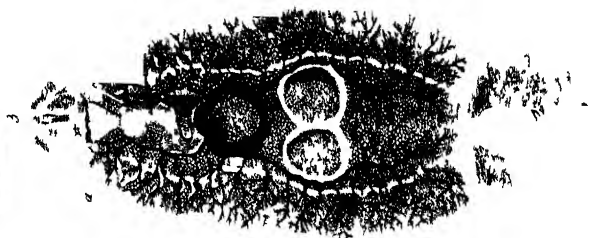
This species I propose thus to characterize:

LYCOPODIUM CATHARTICUM.

(Plate XIV.)

Caule ascendente dichotomo, ramis (cum foliis) acutis, acute tetragonis
foliis arcte quadrifariam imbricatis ovato-acuminatis rigidis carinatis

* *Ionidium parviflorum*, of which see an account in 'Companion to the Botanical Magazine', vol. i. p. 277.



1 3 Philine Hipp 0' 1 1 resula Angulata

glabris basi paululum productis marginibus incurvis ciliatis, capsulis, axillaribus reniformibus bivalvibus.

Hab. Asuay of the equator, *Hon. Wm. Turner*. Mountains of Pillzhum, *Prof. W. Jameson*.

Caulis inferne radicans, procumbens, dein erectus, dichotomus, spithameus, *penna corvina* parum crassior, ramis elongatis apice acutis. *Folia* quadrifarium arete imbricata, erecta, rigida, ovata, acuminata, paululum incurva, rigida, glabra, subnitida, plerumque rufa, rarius pallide viridia, basi paululum producta, dorso carinata, marginibus subinflexis, obsolete lacerociliatis. *Capsulae* axillares, majuscula, folio paulo latiores, reniformes, bivalves flavae. *Sporulae* minutae, flavae.

As a species this may be considered allied to my *L. rufescens* (Icones Plantarum, vol. i. tab. 36) from the same country, but it is quite distinct. The leaves are erect and closely imbricated in four ranks, and with such regularity that the keels of the leaves form four continued lines or angles, and between these are four flat sides, so that the stems and branches have a perfectly square appearance.

Fig. 1. Portion of the stem and leaves. Fig. 2. Side view, and fig. 3, back view of a leaf, with the capsule. Fig. 4. Capsule, magnified.

XI.VII.—*Miscellanea Zoologica*. By GEORGE JOHNSTON, M.D., Fellow of the Royal College of Surgeons of Edinburgh.

V. DESCRIPTIONS OF SOME ENTOMOZOA.

[With a Plate.]

PHYLLINE HIPPOGLOSSI. Plate XV. Fig. 1—3.

Generic character. “*Corpus complanatum, breve, suborale, gelatinosum, disco contractili magno ucinis armato posticè terminatum.*” Lamarek.

Specific character. “*Ph. dilatata, albidu; medio corporis ocello didymo candido.*”

Ph. Hippoglossi, *Lam. Anim. s. Vert.* v. 295. *Stark, Elem.* ii. 142.—*Hirudo Hippoglossi*, *Mull. Zool. Dan. Prod.* 220, no. 2669. *Zool. Dan.* tab. 54. fig. 1—4. *Fabr. Faun. Grænl.* 322, no. 302. fig. 8. *Tart. Gmel.* iv. 71. *K. E. v. Baer in Nov. Act. Acad. Cæs. Leop. Nat. Cur.* xiii. 678. pl. 32. fig. 5—6.

DESC. The body is about an inch long and three-quarters of an inch broad, ovate, flat, thin, and semitransparent, lubricous, firm, and somewhat cartilaginous to the touch, smooth,

watery-white, veined with milk-white and clear lines, the veining less distinct on the dorsal than on the ventral aspect. The body is narrowest anteriorly, and in front there is a small piece which the animal can elongate to a slight extent and make more or less concave; the sides of this piece, from their greater opacity, appear to be thickened, but they are not conformed into proper suckers. A little behind this frontlet, and on the ventral surface, is the mouth, which has the appearance of a very short, thick proboscis of a slightly corneous texture, striated and obscurely three-lobed on the outer edge: it can probably be protruded more or less, and when fully extended by pressure resembles a short inverted cone (fig. 3. *a.*) A little posterior to the proboscis we find generally, for they are not constant, two ill-defined spots or organs (*b*); and posterior to them, in the mesial line, a round viscus filled with granular matter (*c*), above which there is usually to be seen a yellowish-brown capsule or vesicle (*o*) with a long tortuous thread attached to it, which runs forward obliquely by the side of the mouth, opening outwardly on the margin below the frontlet (*d*). Proceeding backwards in our examination we next observe two very conspicuous round spots (*e, e*) separate although closely approximated, and placed one on each side of the axis of the body: they are filled with granules, and form a marked character in the worm from their distinctness, and from being encircled with milk-white vessels, from whose posterior arch numerous capillary branchlets go off to ramify in the space between them and the sucker. The posterior edge of the body is truncate with a slight prominence in the middle, whence the sucker originates, and above which the anus opens. The sucker is very large, subpedicellate, circular, concave, rough with tubercles arranged in rows, and covering rather more than two thirds of the disks, for the upper side is smooth; and it is also furnished with two pairs of elongate spiriform teeth so placed as to form by their union a sort of oblong or horse-shoe shaped space running from the inferior margin to the centre of the sucker (*s*).

Along each side of the body, running from near the head to the tail, we readily distinguish, by its transparency, a large vessel that seems as if it were rather excavated in the granu-

lar parenchyma than a distinct formation with proper coats. These are the intestinal canals. I cannot trace their rise, nor their continuation to the mouth, but their termination in the anus is evident, previous to which they may be observed to nigh one another. Where we first see them near the head, they are fringed with short obtuse canals or caeca, that extend down about a third of their length, the rest of the intestine being simple and undivided.

The vascular system is beautifully developed, and distinguished by the milk-white colour of the vessels. On each side there is a large trunk, which begins in the anterior central or medial organ and runs forward to the mouth; while another of the same size runs backwards to the sucker. From these main trunks numerous lateral branches issue and divide into lesser branchlets, which lose themselves about a line from the margin; for this is quite clear and unvascular, and is not filled even with the granules of which the whole interior of the worm seems to be composed.

This is, I fear, a very imperfect description of a very curious animal, but it is the best I have been able to make, and is well illustrated by the beautiful figure which accompanies it. To determine the connexion and nature of the organs seems to me a doubtful and difficult task. The mouth may be presumed to be ascertained and to have a suctorial character, although Otho Fabricius placed it at the opposite extremity in the centre of the caudal discs. The functions of the viscera behind it are conjectural. I have sometimes thought that the two foremost (*b*) were stomachical, but have been unable to trace any canal of communication between them and the mouth or the intestines; and it may be that they are rather subservient to generation, standing in the place of the male organs. The nature of the intestinal canals is not disputable: their course and termination in the anus prove their office, and they are extremely like the alimentary canal of the *Diplozoon*, an evidently affined animal, in which Nordmann ascertained the functions of the parts in question. The organ marked (*o*) is evidently connected with the reproduction of the species. Nordmann calls an exactly analogous organ of the *Diplozoon* a testicle, and the long thread-like filament he believes to be

a penis ; but this I am certain is an erroneous view of their nature ; and it seems, on the contrary, to be rendered at least probable, by my observations on the *Udonella caligorum* (Mag. Nat. History, vol. viii. p. 497), that the organ is a vesicle containing ova or embryo young, which the *Phylline* lays and attaches to the fish by means of the filament. The round granular viscus connected with it (c) may be that in which the ova are invested with their capsules ; and the didymous organs in the centre of the body appear to be ovaries in which the ova are themselves produced. From the rescarches of Nordmann in analogous worms, we may suspect that there are two sets of blood-vessels and a true circulation, but I could see one set only, such as they are delineated in our figure ; and in this respect the circulating system resembles that of the *Planariæ* as described by Duges.

Phylline Hippoglossi has not been previously recorded as a native of our seas. It lives parasitically on the Holibut (*Hippoglossus vulgaris*) ; and about two years since I found numerous specimens on a large individual that had been captured in Berwick Bay. Following the older authors, Cuvier and Lamarck have arranged it among the Leeches, but they were well aware of the unnaturalness of this allocation, for its nigher relations with the *Polystomæ* and *Planariæ* are too obvious to be overlooked ; and, though living on the external surface, the structure proves that, in the system of nature, it forms one of a family (Trematoda, *Rud.*, Sterelmintha, *Owen*), of which the greater number live within the intestines of other animals.

PLATE XV. fig. 1, 2, *Phylline Hippoglossi* of the natural size ; the 1 a view of the dorsal, the 2 of the ventral surface. Fig. 3. The same magnified.

FASCIOLA ANGUILLÆ. Plate XV. fig. 4—6.

Generic character. “*Corpus molle, oblongum, depressum, interdum teretiusculum ; poris duobus remotis : altero antico subterminali ; altero ventrali, laterali aut infero.—Os : porus anticus. Anus : porus ventralis.*” Lamarck.

Specific character. “*F. depressiuscula, subovata, crenata, postice emarginata ; pori antlei margine tumido, ventralis majoris recto.*” Lam. Anim. s. Vert. iii. 182. Turt. Gmel. iv. 36.

DESC. The body is about three lines long, oblong-ovate when at rest, but extensible and mutable to a considerable degree, not much compressed, of a brown colour varying in intensity and more or less clouded, smooth, somewhat transparent. Mouth subterminal, placed under the narrower end, circular, edentulous, with a thickened lip: the ventral sucker about a line backwards, larger, encircled with a prominent plain rim: posterior extremity obtuse, thickened, wrinkled and opake, with a small emargination in the middle.

This worm has that degree of transparency which allows the viscera to be seen through the skin, but to trace their figures and disposition it is necessary to compress the body slightly between plates of glass. The mouth (fig. 5, *a*.) is capable of being shut close or dilated to a considerable width, the aperture assuming, in the change, sometimes a circular and sometimes a triangular figure, but it is not susceptible of being protruded beyond the surface. The powerful sphincter encircling it enables the animal to apply the orifice very closely and firmly to the surface of the stomach of the fish it infests. The œsophagus is extremely short. From each side of it there proceeds, nearly at right angles, an intestine (*i*) very narrow at its origin, but suddenly dilating, it trends, in a flexuous curve, towards the sucker (*s*), whence it proceeds down the body in nearly a straight course and ends in a cul-de-sac near the posterior extremity. This intestine is filled with a colourless liquid, and, as the liquid does not escape on pressure from the mouth, but undulates backwards and forwards, we are led to infer that a valvular apparatus at the origin of the intestine prevents its efflux. The lower half of these intestinal tubes is plaited transversely. Returning to the œsophagus we observe an organ (*t*), apparently continued from it down the middle of the neck, and dilating into a pear-shaped sac of a faint reddish colour, situated anteriorly to the sucker. This sac is supposed to be a testicle, with what degree of probability I am not prepared to say. The ovary or oviduct forms a greatly convulated opake thread, which occupies principally the centre of the body between the sucker and the tail: the inferior end of it seems to be connected in some way with the thickened tail of the worm, although I have not been able to

discover the exact nature of the connexion. On compressing a specimen, the tail was suddenly thrust out like a concealed proboscis, carrying the end of the ovary with it, as is represented at fig. 6; but this occurred only once, notwithstanding many subsequent trials on other specimens. The course of the ovarian tube is shown in fig. 5, but it is far from constant, and in many specimens there is less of it than is there exhibited between the sucker and the mouth,—in some none at all. The duct is narrower at some places than at others; is of a dirty greenish colour, and composed of numberless ova, enveloped and imbedded in a colourless jelly; for the organ is not hollow, as the term duct would seem to imply, but a filament formed of ova and jelly retained by a thin pellicle. When examined separately the ova are of an ovate shape, pellucid, with a speck in the centre, and in fact are very like the sporules of parasitical fungi. I could not in any instance make them separate and escape from the body without tearing the skin; but that they escape naturally by a minute aperture in the emargination of the posterior extremity, I was led to conjecture from the circumstance just mentioned of the oviduct being drawn down with it in its forced evolution; but the conjecture is, perhaps, rendered improbable from its contrariety to what occurs in other species. Mr. Owen in a large *Distoma* (a generic name often used for the *Fasciola*) found that the orifice in question formed the outlet of a glandular sac lodged in the enlarged extremity (Cyclop. of Anat. and Physiology, vol. ii. pp. 133 and 136); and Nordmann supposes that a similar aperture in the *Diplostomum* is the termination of a canal continued from the oviduct, a supposition which agrees well with our observation. The ova, Cuvier says, “sortent par un canal replié qui aboutit à un petit trou à côté de la verge.” (Règne Anim. iii. 264.) Such an organ and canal I could not discover in the species under examination. On each side of the sucker, and usually behind it, there is a large roundish viscus of a milk-white colour, apparently unconnected with either the ovary or intestine, although it is probable that a connexion does really exist. They are also supposed to be connected with the generative functions; and of the same nature we are told is a similar viscus situated nearer the middle



Erythraea diffusa.

of the body and of a less regular shape ; but the ascription of functions to these organs is surely in a great degree conjectural. I could detect no traces of either a vascular or nervous system ; and the absence of the former seems remarkable after finding it so fully developed in *Phylline*. The skin is a thin pellucid pellicle traversed with lines in a netted manner.

The specimens from which our description is taken were found in the stomach of a conger-eel. They stuck to the villous surface by their ventral sucker, but were removable without difficulty. Their motions are very slow. The anterior extremity can be lengthened to a considerable extent, when it assumes the form of a narrow cylindrical neck ; and the figure of the body is also changeable, though less so than the front. I presume it is this protean character which induced Rudolphi to call the species *Distoma polymorphum*.

PLATE XV. fig. 4. *Fasciola anguillæ* of the natural size.—Fig. 5. The same magnified.—Fig. 6. The anal extremity as it appeared when evolved by pressure.

[To be continued.]

XLVIII.—On the *Erythræa diffusa*, Woods (*Gentiana scilloides*, Linn. fil.). By Sir W. J. HOOKER. (With some Remarks on the Genus. By Dr. GRIESBACH.)

[With a Plate.]

IN the year 1835 our valued friend Mr. Joseph Woods made an interesting discovery in Britany of an *Erythræa*, which he had good reason for believing to be undescribed, and to which he gave the appropriate name of *diffusa*. His account of it, in his ‘Botanical Excursion into Brittany’*, is as follows.

“On the 25th of June we came to Morlaix, and on a piece of rough ground, at a very short distance south-west of the town, found an *Erythræa*, which appears not to have been previously noticed. Its characteristics are the diffuse mode of growth, without any indication of a leading stem, and the few flowers, not above two or three, in a panicle. This did not arise from late shoots, as the *Erythræa* had hardly yet begun to flower, and this may be considered as among the

* See Companion to the Botanical Magazine, vol. ii. p. 274.

earliest; nor had it been eaten by cattle, for most of it was well protected by the prickles of the *Ulex*, among which it grew; nor was it owing to that shelter, for some of it was in open and exposed situations. In all the appearance was alike, and I should propose to call it *Erythræa diffusa*; *caulibus diffusis subbifloris*.

“The subulate divisions of the calyx afford here no character, being sometimes quite as long as the tube of the corolla, and sometimes considerably shorter. I find a specimen of this species in the Herbarium of the late Sir James E. Smith, from the Azores, with a memorandum, in that learned botanist's hand-writing, that it is the *Chironia maritima* of the Hortus Kewensis, but not of Willdenow; the description of *C. maritima* in that work is, however, by no means such as would identify the plant, and the principal reason for the supposition probably is that it is stated to have been introduced from the Azores by F. Masson. The flowers are red.”

Specimens which Mr. Woods kindly communicated to me were sent with my whole collection of *Gentianææ* to Dr. Griesbach at Berlin, to assist him in his monograph of that natural order. That gentleman ascertained it to be a plant of Linnæus's Supplement, but unknown to every author since the publication of that work, the *Gentiana scilloides* (Linn. fil.), a species of the “Azores, found by Mr. Francis Masson.” It is true that Dr. Griesbach has been led to this determination by description alone; but the correctness of his judgement is confirmed by the above observation of Mr. Woods, viz. that there exists in the Linnæan Herbarium of Sir J. E. Smith a specimen of the same plant, sent from the Azores by Masson.

The observations in Dr. Griesbach's letter to me, upon this and other species of *Erythræa*, will be read with interest.

“*Erythræa diffusa* (Woods) is indeed a new and highly interesting species, as it will serve to do away with an old name of a now unknown plant, since I cannot doubt this to be the *Gentiana scilloides* (Linn. fil.), a species insufficiently described, and of which all botanists are ignorant. The obscure terms used in the ‘Supplement’, though coinciding in the more important points with the plant of Mr. Woods, could hardly have suggested the idea that this is an *Erythræa*. It stands next

to *E. portensis* (Link), but it differs sufficiently by ascending stems, the form of the leaves, and length of the calyx; the latter character is indeed most important in helping to distinguish the polymorphous *Erythræa*, as you will see by the following list of all the species which I know.

“The tube of the corolla, when in flower, is *as long as the calyx* in *E. linearifolia* (Pers.), *chilensis* (Pers.), *caspica* (Fisch.), *maritima* (Pers.), *spicata* (Pers.), and probably *E. elodes* (R.S.); it is *from one-fourth to one-third longer* than the calyx in *E. ramosissima* (Pers.), *latifolia* (Smith,—a variety of which is *E. tenuiflora*, Link), *quitensis* (Kunth), *Roxburghii* (Don), *australis* (Br.), *Mühlenbergii* (mihi), *mexicana* (mihi), and *diffusa* (Woods); *double as long* as the calyx in *E. Centaurium* (Pers.), *portensis* (Link), and *trichantha* (mihi).

“You will see that I have done justice to the *Erythræa* of the British Flora. Those species in your Compendium are as good species as any in the system, and the English Botany is the very best basis for a correct knowledge of the European *Erythræa*. *E. littoralis* is the same with *E. cæspitosa* (Link), and this again is a smaller form or variety of *E. linearifolia* (Pers.), which grows especially on the German sea-shores, and of which I will not forget to send you specimens. These forms have been tolerably represented in Reichenbach’s ‘Iconographia’: there are not less than fifteen synonyms of this species.

“*E. pulchella* (Fries), again, is a smaller variety of *E. ramosissima* (Pers.), but the latter is identical with the English *E. pulchella*; to this species I also refer *E. Meyeri* (Ledeb.), having seen intermediate states, and even our form itself, from Siberia. *E. latifolia* has a straight, nearly simple, and narrow-flowered variety, also on the sea-shores of the south of Europe; this is *E. tenuiflora* (Link), or *E. centauroides* (Schräd.), or *E. arenaria* (Prest.), which occurs almost always wrongly named in herbaria, though it is a remarkably common appearance of the plant.

“Some years ago a dissertation on the genus *Erythræa* was published by M. Schmidt, but seldom have species and synonyms been so much confounded as by this writer.”

The following character and description, aided by the ac-

companying figure, which was drawn from Mr. Woods's specimen, will, I trust, remove all doubts in future respecting this beautiful little plant.

ERYTHRÆA DIFFUSA.

(§ *Euerythræa*, *Griesb.*)

E. diffusa; caulibus cæspitosis adscendentibus inferne ramosis, ramis 1—3-floris, foliis inferioribus approximatis elliptico-subrotundis spathulatisque trinerviis, caulinis ellipticis oblongisque obtusiusculis, corollæ tubo sub anthesi calycem paullo superante, lobis tubum subæquantibus ellipticis acutiusculis. *Griesb.* MSS. Tab. Nostr.

Erythræa diffusa, *Woods*, in *Hook. Comp. to Bot. Mag.* v. ii. p. 271.—*Chironia maritima*, *Hort. Kew. Smith*, in *Herb. suo*, apud *Soc. Linn.* (sed vix fide *Woods*.)—*Gentiana scilloides*, *Linn. Suppl.* p. 175. *Willd. Sp. Pl.* v. i. p. 1346. *Ræm. & Sch.* v. vi. p. 163.

Hab. Azores, *Francis Masson*. On a piece of rough ground, near Morlaix, in Britany, *Joseph Woods, Esq.*

DESCR. Glaberrima. *Caulis* gracilis, quadrangulus, digitalis fere ad spithamæam, inferne decumbens, ramosus; *rami* elongati, erecti, subsimplices, apice 1—3 flori. *Folia* opposita, decussata, semiunciam longa, inferiora approximata elliptica vel subrotundo-spathulata, superiora magis remota, oblonga, sessilia, omnia integerrima, obtusa, nitidiuscula, trinervia. *Flores* terminales, solitarii, bini vel terni, majusculi, pulcherrime rosei; siccitate sæpe fusco-lutei. *Calyx* basi bibracteatus vel nudus, raro unibracteatus, gracilis, 5-fidus, subangulatus, laciniis subulatis erectis tubum æquantibus. *Corolla* hypocrateriformis. *Tubus* gracilis, superne angustior, ante anthesin calycem vix excedente, sub anthesi calyce $\frac{1}{2}$ longior, limbo 4 partito, segmentis ellipticis patentibus, acutiusculis. *Antheræ* exsertæ, oblongæ, flavæ, spiraliter tortæ. *Stylus* longitudine staminum. *Stigma* crassum, bilobum.

XLIX.—*Prodromus of a Monograph of the Radiata and Echinodermata.* By LOUIS AGASSIZ, D.M.*

[Continued from p. 307.]

III.

THE Stellerides constitute the last order of the class of Echinodermata. Their starlike form, the mobility of their rays, which are frequently manifoldly subdivided, the position of the mouth at the centre of the inferior surface, are the most prominent external characters of this division, in which we must admit three families; the *Asteriæ*, the *Ophiuræ*, and the *Crinoïdea*. With respect to their organization Ehrenberg has recently made the interesting discovery that *Asterias*

* Translated from the *Annales des Sciences Naturelles* for May 1837.

violacea possesses eyes, showing themselves as beautiful red points on the under surface of the extremity of the five rays.

1. The *Asteriæ* answer to the limits which Lamarck had assigned to the genus of this name, established by Linnæus in a more comprehensive view. What distinguishes them is their possessing a single orifice of the intestinal canal surrounded by suckers but void of teeth. On the dorsal surface we remark between the two posterior rays a lamellate or rather a fibrous tubercle, which has been denominated madreporiform. There are deep grooves from the mouth to the extremity of the rays containing several series of pedicels.

1. *ASTERIAS*, Linn. and Ag. (*Astropecten*, Link.—*Crenaster*, Lloyd.—*Pentastérie*, De Blain. in part.—*Stellaria*, Nardo, a name already employed for a genus of plants.) Body starlike; superior surface tessellated; rays flattened, edged with two series of large laminæ bearing small spines.

A. aurantiaca, Linn.—*A. bispinosa*, Otto.—*A. calcitrapa*, Lam., and several new species.

2. *CÆLASTER*, Ag.—Differs from the preceding genus in having the interior cavity circumscribed by laminæ arranged like those of the *Echini*, and at whose summits we observe a star of ambulacra. This genus approaches therefore by its organization to the family of the *Crinoidea*, while its form is that of the true *Asteriæ*. I am only acquainted with one fossil species, which is from the chalk.

C. Coulon, Ag.

3. *GONIASTER*, Ag. (*Scutastérie* and *Platastérie*, De Bl.)—Body pentagonal, bordered by a double series of laminæ bearing small spines; upper surface nodose.

G. reticulatus, Ag. (*Asterias retic.*, Linn.)—*G. equestris*, Ag. (*Ast. equ.*, Linn.)—*G. nodosus*, Ag. (*Ast. nod.*, Linn.)—*G. tessellatus*, Ag. (*Ast. tessel.*, Lam.) I think this is also the place for several imperfectly known fossil species, as *G. porosus*, Ag.—*G. Couloni*, Ag.—*Asterias quinqueloba*, Goldf.—*A. jurensis*, Munst.—The laminæ described under the names of *Ast. scutata*, *stellifera*, and *tabulata* are probably only the calycinal laminæ of some unknown *Crinoidea*, if they do not belong to this genus.

4. *OPHIDIASTER*, Ag.—Body starlike, finely tessellated on its whole surface, inferior grooves very narrow.

O. ophidianus, Ag. (*Ast. ophid.*, Lam.)

5. *LINKIA*, Nardo (*Cribella*, Ag., MSS.)—Body starlike, rays tuberculous and elongated; epidermis porous in the intervals.

L. variolata, N. (*Ast. variol.*, Lam.)—*L. typus*, N.—*L. Franciscus*, N. The species described by Goldfuss under the names of *Asterias arenicola* and *obtusata*, appear to form a separate genus which might be called *Pleuraster*. I am however not sufficiently acquainted with them to decide.

6. STELLONIA, Nardo (*Uraster*, Ag., MSS.—*Pentastérie*, De Bl. in part, and his *Solastéries*).—Body starlike, entirely covered with more or less prominent spines.

St. rubens, Nardo (Ast. rub., Linn.).—*St. sepitosa*, N. (Ast. sepit., Linn.)—*St. glacialis*, N. (Ast. glac., Linn.)—*St. spinosa*, N. (Ast. spin., Link.)—*St. angulosa*, Ag. (Ast. angul., Mull.)—*St. endeca*, Ag. (Ast. end., Linn.)—*St. papposa*, Ag. (Ast. pap., Linn.)—*St. Helianthus*, Ag. (Ast. Hel., Lam.)—*St. Echinilis*, Ag. (Ast. Echin., Lam.)—Those species in which the number of rays varies from 5 to 7 form the transition to the true *Solasteriæ*. The *Ast. lanceolata* and *lumbricalis*, Goldf., should probably also be referred to this genus.

7. ASTERINA, Nardo (*Clenaster*, Ag. MSS.—*Asterias*, sect. C. De Bl.—*Pentaceros*, Link).—Body pentagonal, covered with pectinated scales; upper surface inflated; grooves of the under surface deep.

A. minuta, N. (Ast. minuta, Linn.)

8. PALMIPES, Link. (*Palmastérie*, De Bl.—*Anscropoda*, Nardo).—Body pentagonal, very flat, thin, but membranaceous at its edges.

P. membranaceus, Link.

9. CULCITA, Ag.—Body pentagonal, slit at the angles; teguments granular.

C. discoidea, Ag. (*Asterias discoid.*, Lam.)

II. The *Ophiuræ* are distinguished from the *Asteriæ* by the central part of their body forming a distinct and flattened disc, to which are annexed more or less elongated and even ramified rays, with no grooves on their under surface.

1. OPHIURA, Lam. and Ag. (Sect. A. De Bl.)—Disc much flattened; rays simple, squamose, bearing very short spines adhering to the rays.

O. texturata, Lam.—*O. lacertosa*, Lam., &c.

2. OPHIOCOMA, Ag. (*Ophiura*, De Bl. sect. B.)—This genus differs from the preceding in having long, very moveable spines attached to the rays.

O. squamata, Ag. (*Ophiura squam.*, Lam.)—*O. Echinata*, Ag. (*Ophiur. echin.*, Lam.), &c.

3. OPHIURELLA, Ag.—Disc scarcely distinct. All the species are fossil.

O. carinata, Ag. (*Ophiura car.*, Munst.)—*O. speciosa*, Ag. (*Ophiura spec.*, Munst.)—*O. Milleri*, Ag. (*Ophiura Mill.*, Phil.)—*O. Egertoni*, Ag. (*Ophiura Egertoni*, Brod.)

4. ACROURA, Ag., is closely allied to *Ophiura*, properly so called, but differs in having, instead of the spines, small scales placed on the sides of the rays. The rays themselves are very rough. One fossil species.

A. prisca, Ag. (*Ophiura prisc.*, *Munst.*)

5. *ASPIDURA*, Ag.—A star of ten plates covers the upper surface of the disc, while the rays, which are proportionally large, are surrounded by imbricate scales. One fossil species.

A. loricate, Ag. (*Ophiura loric.*, *Goldf.*)

6. *TRICHAETER*, Ag. (*Euryale*, *Auct.*)—Rays furcate at their extremity.

T. palmifer, Ag. (*Euryale palmifer*, *Lam.*)

7. *EURYALE*, *Lam.* (*Astrophyton*, *Link.*—*Gorgono-cephalus*, *Shaw.*)—Disc pentagonal; rays branched and sub-branched from their base.

E. verrucosum, *Lam.*—*E. costatum*, *Lam.*—*E. asperum*, *Lam.*—*E. mucicatum*, *Lam.*—*E. mediterraneum*, *Risso.* (This last species does certainly exist in the Mediterranean; I have seen several specimens collected in the bay of Naples by Dr. Buckland. I make this observation because the existence of this species has quite recently been placed in doubt, although Rondelet mentions it.)

III. The *Crinoidea*, notwithstanding their starlike form and their great external resemblance to the *Asteriæ*, constitute however a distinct family, characterized by the presence of two separate orifices to the intestinal canal, although very near to each other. These orifices are by no means easily distinguished among the rays which surround them, especially in the fossil species. The greatest part of the species are pediculate, i. e. carried on a foot-stalk adhering to the centre of the region, which, in the star fish, we considered as the middle of the dorsal surface.

1. *COMATULA*, *Lam.* (*Astrocoma*, *De Bl.*—*Decameros*, *Link.*—*Antedon*, *Frem.*—*Alecto*, *Leach.*)—Disc pentagonal, arched at its upper surface, which bears several series of simple and articulated rays; rays of the disc bifurcate, beginning however with two simple pieces. The edges of the rays are pinnate; mouth central, sunk; anus between the mouth and the border of the disc, obliquely prominent. Animal entirely free.

C. mediterranea, *Lam.*, &c.

2. *COMASTER*, Ag. (*Comatula*, *Auct.*)—This genus has the same organization as the preceding, but the arms are ramified instead of being simply furcate.

C. multiradiatus, Ag. (*Comat. mult.*, *Lam.*)

3. *PREOCOMA*, Ag.—Rays pinnate, developed to such a degree and so deeply bifurcate, that there appears to be no disc; body free. A fossil species.

Pt. pinnata, Ag. (*Comatula pinn.*, *Goldf.*)

4. *SACCOCOMA*, Ag.—The disc presents the form of a rounded

cavity, to the border of which are annexed five rough rays, simply bifurcate up to their base, and pinnate. Body free.

S. tenella, Ag. (Comat. tenell., Goldf.)—*S. pectinata*, Ag. (Comat. pec., Goldf.)—*S. filiformis*, Ag. (Comat. filif., Goldf.)

5. GLENOTREMITES, Goldf.—I can only see in this genus the disc of a Crinoid nearly allied to *Comatula*, but not in the least a genus allied to *Echinus*. (See also the 14th genus *Solacrinus*, Goldf.) What distinguishes it is the having at its surface perforated impressions which have been regarded as the points of insertion of spines, but I believe them rather to be the articulated surfaces of dorsal rays, while the five grooves surrounding the mouth are the points of insertion of the rays. Five infundibuliform apertures round the mouth. One fossil species from the chalk.

Gl. paradoxus, Goldf.

6. GANYMEDA, Gray.—The same may be said of this genus as of the preceding, from which it differs by the absence of the five infundibuliform apertures round the mouth; as also of the alternating grooves. The flattened space of the summit is quadrangular. One living species, of which I saw the original specimen at the British Museum.

G. pulchella, Gray.

7. MARSUPITES, Mant. (*Marsupium*, Koen.—*Marsupio-crinites*, De Bl.).—Disc composed of large polygonal laminæ, one of which occupies the centre of the dorsal summit, without offering any trace of a pedicel; three series of these laminæ form the sides of the disc, which resembles a purse, from the borders of which proceed five rays; mouth surrounded by numerous small laminæ. One fossil species from the chalk.

M. ornatus, Mant.

It is probably in the neighbourhood of this genus that the plates which have been described under the names of *Asterias scutata*, *A. stellifera*, and *A. tubulata*, should be arranged if they belong to some unknown Crinoid.

8. PHYTOCRINUS, De Bl. (*Hibernula*, Fl.—*Pentacrinus*, Thomps.)—Pedicel round and articulated without digitation; disc circular, formed of a central piece bearing a series of simple dorsal rays, and nearer to the edge a series of bifurcate and pinnate rays, beginning at the fourth articulation; the first articulations touch one another at their bases. One living species.*

Ph. europæus, De Bl. (*Pent. europ.*, Thomps.)

* [This has been proved by its discoverer to be the young state of *Comatula*.—EDIT.]

9. **PENTACRINUS**, Mill. (*Pentagonites*, Raffin.)—Pedicel more or less pentagonal, bearing at intervals simple verticillate rays; rays of the disc fixed to the pedicel, each by a cuneiform piece followed by two simple pieces, after which the rays bifurcate, and at a little further distance divide into two, which then branch out into numerous appendices, pinnate at their edges. The space between the base of the rays, occupied by the visceral cavity, is formed by numerous small laminae. One living species and several fossil species from the muschelkalk, cretaceous, jurassic, and tertiary, deposits.

Those species in which the accessory rays form more or less distant verticillae might be designated under the name of *Chladocrinus*.

P. dubius, Goldf.—*P. basaltiformis*, Mill.—*P. briareus*, Mill.—*P. cingulatus*, Munst.—*P. muliferus*, Munst. (not Mill.)—*P. annulatus*, Rœm.—*P. pentagonalis*, Gold.—*P. lavis*, Mill.—*P. scalaris*, Goldf.—*P. subangularis*, Mill.—*P. scriptus*, Rœm.—*P. subsulcatus*, Munst.—*P. subteres*, Munst.—*P. tuberculatus*, Mill.—*P. moniliformis*, Mill. (not Munst.)—*P. subbasaltiformis*, Mill.—*P. caput Medusæ*, Mill.

10. **ISOCRINUS**, N. de Meyer.—Nearly allied to *Pentacrinus*, of which it has the pedicel with its simple rays. The first articulations of the rays of the disc are not prominent as in that genus; the upper portion of the pedicel however is more developed. One fossil species from the jura.

I. pendulus, N. de M. (hitherto inedit.)

11. **ENCRIINUS**, Guett.—Pedicel rounded and smooth; rays of the disc formed at their base of three simple consecutive joints, to the last of which are articulated two series of smaller pieces, each bearing at some further distance from the centre, two series of pinnate articulations moveable on their hinges. All the species are fossils from the muschelkalk.

E. liliiformis, auct.—*E. Schlotheimii*, Quenst.

12. **APIOCRINUS**, Mill. (*Astropoda*, Defr.—*Ceriocrinus*, Kœn.—*Pomatocrinus* and *Symphytocrinus*, Kœn.)—Pedicel rounded and smooth, dilating insensibly towards the base of the rays, which are composed first of the three simple consecutive articulations alternating with five distinct pieces from the summit of the pedicel; at some further distance each ray bifurcates and again subdivides into lateral pinnulae. These animals are fixed to the soil by a dilatation more or less considerable of the base of the pedicel. All the species are fossil from the jura and chalk.

A. elongatus, Mill.—*A. flexuosus*, Goldf.—*A. incrassatus*, Rœm.—*A. menpiliiformis*, Schlot.—*A. Milleri*, Schlot.—*A. obconicus*, Goldf.—*A. Pratii*, Gr.—*A. rosaceus*, Schlot.—*A. rotundus*, Mill.—*A. ellipticus*, Mill.

13. *EUGENIACRINUS*, Mill. (*Symphyocrinus*, Kœn.)—Pedicel rounded and smooth, formed of a small number of long articulations. The base of each ray is composed of an inflated and proportionally large piece; all these pieces (there are generally five, but sometimes only four) are connected together. It is not known how the rays ramify. All the species are fossils from the jura. (*E. mespiliformis*, Goldf., from the greywacke appears to have distinct generic characters.)

E. caryophyllatus, Goldf.—*E. compressus*, Goldf.—*E. Nausmanni*, Roem. *E. Noferi*, Munst.—*E. moniliformis*, Munst.—*E. nutans*, Goldf.—*E. piriiformis*, Munst.—*E. quinquangularis*, Mill.

14. *SOLACRINUS*, Goldf.—At first sight, this genus does not appear to differ from *Eugeniocrinus*, by the side of which Goldfuss placed them, except by the presence of small distinct articulations between the base of the rays. However I believe it to be more nearly allied to *Comatula*, and especially to the genus *Glenotremites*. The pedicel is very short, rounded at its extremity, which makes me think that these animals were free, and that the impressions which we notice on the pedicel were the points of insertion of rays similar to those which the *Comatulæ* bear on their dorsal surface. But not having had opportunity to examine them myself, I leave them provisionally in the place which the author of this genus has assigned to them. All the species are fossils from the jura.

S. costatus, Goldf.—*S. scrobiculatus*, Munst.—*S. Jægeri*, Gold.

15. *RHODOCRINUS*, Mill.—Pedicel more or less rounded, traversed by a pentagonal canal, base of the rays formed of five small articulations, each topped by two other rather larger pieces, after which follow other laminæ similar but less regular and smaller, which form underneath the visceral cavity, from the edge of which proceed five rays which branch out like those of the *Pentacrini*. The species are fossils from the greywacke and carboniferous limestone. (The *Rh. echinatus*, Schlot., with spiny pedicel from the jura, appears to form a distinct genus, the characters of which I am yet unable to indicate, being unacquainted with the structure of the rays.)

Rh. canaliculatus, Goldf.—*Rh. gyratus*, Goldf.—*Rh. quinquepartitus*, Goldf.—*Rh. crenatus*, Goldf.—*Rh. verus*, Mill.—*Rh. quinquangularis*, Mill.

16. *ACTINOCRINUS*, Mill. (*Rhodocrinus*, Kœn.)—This genus differs from the preceding by its pedicel being pierced by a round canal; the laminæ of the disc which surround the sides of the visceral cavity are more numerous and less regularly disposed. The species are fossils from the greywacke and carboniferous limestone.

A. cingulatus, Goldf.—*A. granulatus*, Goldf.—*A. moniliformis*, Mill.—*A. muricatus*, Goldf.—*A. nodulosus*, Goldf.—*A. gothlandicus*, Goldf.—*A. lævis*, Mill.—*A. polydactylus*, Mill.—*A. tessellatus*, Goldf.—*A. triacontadactylus*, Mill.—*A. tesseracontadactylus*, Mill.

17. *MELOCRINUS*, Goldf.—This genus differs from *Rhodocrinus* and *Actinocrinus* only in the base of the five rays alternating with five pieces distinct from the summit of the pedicel, and the laminæ which close the visceral cavity above being larger than those inclosed between the rays at the point where they separate from the disc. In other respects the structure of the *Rhodocrinus*, *Actinocrinus*, and *Melocrinus* is very similar. The species are fossils from the greywacke and carboniferous limestone.

M. gibbosus, Goldf.—*M. lævis*, Goldf.—*M. hieroglyphicus*, Goldf.

18. *EUCALYPTOCRINUS*, Goldf.—Visceral cavity spacious, surrounded at its base by five plates which alternate with three series of ten laminæ on the edges of which are inserted the rays. One fossil species from the greywacke.

E. rosaceus, Goldf.

19. *POTERICRINUS*, Mill.—Pedicel rounded, pierced by a round canal; visceral cavity surrounded at its sides by three alternating series of five large hexagonal laminæ, the upper of which bear five bifurcate rays composed of elongated articulations. The species are fossils from the carboniferous limestone.

P. crassus, Mill.—*P. tenuis*, Mill.

20. *PLATYCRINUS*, Mill.—The base of the rays is composed of five large laminæ adhering to each other, and alternating with the five distinct pieces of the summit of the pedicel; the five rays are inserted at the edges; between their bases five small laminæ may be distinguished; above these are some very small ones which close the visceral cavity. The species are fossils from the greywacke and the carboniferous limestone.

Pl. ventricosus, Goldf.—*Pl. granulatus*, Mill.—*Pl. pentangularis*, Mill.—*Pl. rugosus*, Mill.—*Pl. striatus*, Mill.—*Pl. lævis*, Mill.—*Pl. tuberculatus*, Mill.—*Pl. depressus*, Goldf.

21. *CYATHOCRINUS*, Mill.—This genus differs from the preceding only by the disposition of the large laminæ which surround the visceral cavity, and which are in two series, while in *Platycrinus* there is but one. Between the bases of the rays we notice a small hexagonal lamina. The pedicel is either round or pentagonal, furnished with small simple rays. The species are fossils from the greywacke and carboniferous limestone.

C. geometricus, Goldf.—*C. pinnatus*, Goldf.—*C. rugosus*, Mill.—*C. tuberculatus*, Mill.—*C. planus*, Mill.—*C. quinquangularis*, Mill.—*C. abbreviatus*, Mill.—*C. pentagonus*, Goldf.

22. SPHÆRONITES, His. (*Echinosphærites*, Wahl.)—Possessing but very imperfect specimens of this genus, I am unable to give the characters. It is however certain that they are nearly allied to *Cyathocrinus*. Fossils from the greywacke.

S. pomum, His.—*S. aurantium*, Wahl.—*S. granatum*, Wahl.—*S. Wahlbergii*, Esmark.

23. CARYOCRINUS, Say.—Visceral cavity surrounded by polygonal laminæ, forming two series of six laminæ and one of eight, four of which bear bifid rays. Fossils from the greywacke.

C. ornatus, Say.—*C. loricatus*, Say.

24. CUPRESSOCRINUS, Goldf.—Pedicel rounded, pierced by a canal in the form of a cross; five inflated pieces at the summit of the pedicel between which the two first pieces of the base of the rays are articulated; they are the smallest, and on them are placed large laminæ arranged in pyramids, the borders of which bear small moveable appendices. Fossils from the greywacke. (*C. gracilis*, Goldf., ought in my opinion to be placed under *Cyathocrinus*.)

C. crassus, Goldf.

25. PENTREMITES, Say.—Body pentagonal, carried on a very short pedicel surmounted by five distinct pieces, above which arise five rays of a pyramidal form, which may be compared to the interambulacral spaces of an *Echinus*. Between the laminæ of these rays we find five very large interambulacral spaces situated on the upper surface of the body, at the summit of which we notice five large holes alternating with these spaces. This genus thus presents characters analogous to those of all the families belonging to the class Echinodermata; it is also one of those whose species are found in the oldest deposits.

P. florealis, Say.—*P. ovalis*, Goldf.—*P. derbiensis*, Sow.—*P. piriformis*, Say.—*P. ellipticus*, Sow.—*P. globosus*, Say.

In this synoptical table of the Radiata I have abstained from enumerating all the doubtful species, trusting to be able to make them better known when I publish the detailed Monograph of this class, of which I have given here but a very abridged sketch. In the indication of the generic characters I have endeavoured to express them in the most simple manner, and I have avoided all the improper terms of nomenclature which Miller introduced in order to describe the laminæ which surround the inferior portion of the visce-

ral cavity of the *Crinoidea*, and which serve for the insertion of their rays. In fact there is nothing in these animals which can be compared to a bason, to costal or intercostal pieces, to a shoulder blade, to arms, to a hand, to fingers, to tentacula, to a clavicle, to pectoral or capital plates, and which would justify the use of these terms to designate simple calcareous plates similar to those of the *Echinus* and Starfish, disposed even in general, as in those two families, and offering no other differences than the following; namely, that at the dorsal surface a certain number of plates is developed one upon the other, which form a pedicel more or less long and moveable; that the principal cavity of the animal is surrounded at its sides by laminæ varying much in number and in form in the different genera, and arranged very diversely around the mouth; and lastly, that the rays which depart from the central disc ramify in various ways. In order to simplify the names generally so very long which have been given to the genera of the family of the *Crinoidea*, I have everywhere changed the termination *crinites* into *crinus*, as M. de Blainville had previously done for some of them.

L.—*Descriptions of British Chalcidites.* By FRANCIS WALKER, F.L.S.

[Continued from p. 387.]

Sp. 16. *Cirrospilus* Lycophron, Fem. *Cupreus*, antennæ nigræ, pedes virides flavo-cincti, alæ limpidae.

Obscure cupreus: oculi et ocelli rufi: antennæ nigræ; articulus 1^{us} æneus: abdomen cupreum, basi micans: pedes virides; trochanteres fusci; genua albida; tarsi fulvi, apice fusci: alæ sublimpidæ; squamulæ piccæ; nervi fulvi. (Corp. long. lin. 2.— $\frac{3}{4}$; alar. lin. 1—1 $\frac{1}{4}$.)

Var. β . Purpureo-cupreus: tarsi læte flavi, apice fusci.

Found near London.

Mas. Corpus sublineare, læve, nitens, parce hirtum: caput transversum, breve, convexum, juxta thoraci latum; vertex angustus; frons abrupte declivis: oculi sat magni: antennæ setacæ, hirtæ, corporis dimidio multo longiores; articulus 1^{us} gracilis, sublinearis; 2^{us} longicyathiformis; 3^{us} et sequentes longi, lineares, usque ad 7^{um} attenuati: thorax longiovatus, convexus: prothorax mediocris, transversus, antice angustior: mesothoracis scutum longitudine vix latius; parapsidum suturæ bene determinatæ; scutellum obconicum; metascutellum parvum, transversum: metathorax conspicuus: petiolus brevissimus: abdomen ovatum, planum, thorace brevius; segmentum 1^{um} sat magnum, 2^{um} et sequentia breviora: pedes mediocres, simplices, subæquales; tarsis articuli 1^o ad 3^{um} curtantes, 4^{us} longior; ungues et pulvilli sat magni; protarsis articulus 1^{us} brevissimus: alæ angustæ, breviter ciliatæ; nervus ulnaris humerali longior, radialis nullus, cubitalis crassus in alæ discum abrupte declivis, stigma minutum.

Sp. 17. Cirr. Coronis, Mas. *Viridis cupreo-varius, antennæ nigrae, pedes virides fulvo-cincti, alæ fuscae.*

Viridis: oculi et ocelli rufi: antennæ nigrae; articuli 1^{us} et 2^{us} virides; thorax cupreo-varius: mesothoracis scutellum apice viridi micans: abdominis discus cupreus: pedes virides; trochanteres ferruginei; genua ferruginea; tarsi fulvi, apice fusci; protarsi fusci: alæ fuscae; squamulae piceae; nervi picei. (Corp. long. lin. $\frac{1}{3}$ — $\frac{1}{2}$; alar. lin. $\frac{2}{3}$ — $\frac{1}{2}$.)

Var. β . Cupreus: mesothoracis scutellum viride, basi cupreum: abdomen basi viride: meso- et metatarsi fusci, basi pallidiores.

Var. γ . Abdomen basi viridi-cyaneum.

Var. δ .—Var. β . similis: thorax viridis.

September; near London, Devonshire.

Mas. C. *Isææ* similis: caput thorace fere latius: antennæ subfiliformes, corporis dimidio longiores; articulus 1^{us} longus, validus, fusiformis; 2^{us} longicyathiformis; 3^{us} latior, sublinearis; 4^{us}, 5^{us} et 6^{us} angustiores, longitudine subæquales; 7^{us} fusiformis, acuminatus, 6^o angustior et paullo longior: prothorax conicus: mesothoracis parapsidum suturae bene determinatae, postice mutuo accedentes: abdomen longi-obconicum, subpetiolatum, thorace paullo brevius et angustius; segmentum 1^{um} longum, angustum; 2^{um} et sequentia brevia, transversa, subæqualia.

Sp. 18. Cirr. Lycomedes, Mas. *Cupreus viridi-varius, antennæ nigrae, pedes ænei, tarsi fusci, alæ subfuscae.*

Cupreus: oculi et ocelli rufi: antennæ nigrae; articulus 1^{us} nigro-æneus: gula fusca: metathorax viridis: abdomen nigro-cupreum, basi læte viride: sexualia fusca: pedes nigro-ænei; trochanteres et genua obscure rufa; tarsi fusci, apice obscuriores: alæ subfuscae; squamulae fuscae; nervi fusci. (Corp. long. lin. $\frac{1}{3}$ — $\frac{1}{2}$; alar. lin. $\frac{1}{2}$ — $\frac{3}{4}$.)

Var. β .—Thorax viridi-cupreus: scutellum apice viridi micans: abdomen basi viridi-æneum.

Var. γ .—Thorax læte viridis; discus cupreo-varius.

Var. δ .—Mesothoracis scutellum viride micans, basi cupreum.

Var. ϵ .—Scutellum purpureo-cupreum, apice aureum.

Var. ζ .—Abdomen omnino cupreum.

Var. η .—Scutellum apice cyaneo-viride.

Var. θ .—Thorax aureo-cupreus: abdomen nigro-viride, basi viride micans, cupreo-varium.

July, August; near London.

Sp. 19. Cirr. Orelia, Mas. *Viridis, abdomen cupreum, antennæ nigrae, pedes virides, tarsi fusci, alæ subfuscae.*

Læte viridis, cyaneo-varius: oculi et ocelli rufi: antennæ nigrae; articuli 1^{us} et 2^{us} virides: abdomen nigro-cupreum, basi viride: pedes virides; trochanteres fulvi; genua fulva; tarsi fusci, basi fulvi: alæ subfuscae; squamulae fuscae; nervi fusci.

Found near London.

Fem. Corpus longum, angustum, nitens, scitissime squameum, parce hirtum: caput transversum, breve, convexum, juxta thoraci latum; vertex

latus: oculi parvi: antennæ subfusiformes, latæ, corporis dimidio multo breviores; articulus 1^{us} gracilis, sublinearis; 2^{us} longicyathiformis; 3^{us} et 4^{us} approximati, subæquales; clava fusiformis, articulo 4^o duplo longior: thorax longiovatus, fere planus: prothorax bene determinatus, transversus, antice angustior: mesothoracis scutum longitudine vix latius; parapsidum suturæ non bene determinatæ; scutellum obconicum: metathorax conspicuus: petiolus brevissimus: abdomen longiovatum, planum, thorace paullo brevius et angustius: pedes simplices, tarsis articuli 1^o ad 3^{um} curtantes, 4^{us} longior; protarsis articulus 1^{us} brevissimus: alæ angustæ; nervus ulnaris humerali longior, radialis nullus, cubitalis sat longus ad alæ apicem propensus; stigma parvum fingens.

Sp. 20. Cirr. Chabrias, Fem. *Viridis cupreo-varius, antennæ nigræ, abdomen cupreum, pedes virides albo-cincti, alæ albæ.*

Læte viridis cupreo-varius: oculi et ocelli rufi: antennæ nigræ; articuli 1^{us} et 2^{us} virides: abdomen supra cupreum: pedes virides; trochanteres piceï; genua albæ; tibiæ apice albæ; tarsi albi, apice fuscï; propedum tibiæ apice et subtus fulvæ, tarsi fuscï: alæ albæ; squamulæ fulvæ; nervi fulvi. (Corp. long. lin. $\frac{1}{2}$ —1; alar. lin. $1\frac{1}{2}$ — $1\frac{1}{2}$.)

Var. β.—Thorax cyaneo-viridis: protibiæ fulvæ, apice et subtus flavæ; mesotarsi apice fulvi.

October: near London.

Fem. Corpus longum, angustum, sublineare, nitens, scitissime squameum, parce hirtum: caput juxta thoraci latum: oculi parvi, subrotundi, fere exstantes: antennæ clavatæ, corporis dimidio breviores; articulus 1^{us} longus, validus, fusiformis; 2^{us} longicyathiformis; 3^{us} et 4^{us} breves; clava longiovata, articulo 4^o latior et plus duplo longior: thorax longiovatus, parum convexus: prothorax breviconicus, transversus, postice incurvus. mesothoracis scutum transversum, parapsides bene determinatæ, scutellum obconicum: metathorax brevis: abdomen longiovatum, depressum, thorace paullo longius et angustius: pedes graciles: alæ amplæ; nervus ulnaris humerali vix brevior, radialis brevissimus, cubitalis longus.

Sp. 21. Cirr. Clinias, Fem. *Cupreus viridi-varius, antennæ nigræ, pedes virides albo-cincti, alæ albidæ.*

Læte viridis, micans: oculi et ocelli rufi: antennæ nigræ; articulus 1^{us} viridis: thoracis discus cupreus; abdomen supra læte cupreum: pedes virides; trochanteres piceï; genua albidæ; tibiæ apice albidæ; tarsi fulvi, basi albi, apice fuscï; propedum tibiæ fulvæ extus virides, tarsi pallide fuscï: alæ albidæ; squamulæ pallide fuscæ; nervi concolores. (Corp. long. lin. $\frac{1}{2}$; alar. lin. $1\frac{1}{2}$.)

Var. β.—Caput supra læte cupreum: thoracis discus cupreus.

Found near London.

Mas. Corpus angustum, sublineare, læve, nitens, parce hirtum: caput transversum, breve, convexum, juxta thoraci latum; vertex angustus: oculi sat magni: antennæ subfiliformes, corporis dimidio multo longiores; articulus 1^{us} gracilis, sublinearis; 2^{us} longicyathiformis; 3^{us} et 4^{us} longi, lineares;

clava fusiformis, apice attenuata et acuminata, articulo 4^o plus duplo longior non latior : thorax longiovatus, convexus : prothorax mediocris, transversus, antice angustior : mesothoracis scutum longitudine vix latius ; parapsidum suturæ bene determinatæ ; scutellum obconicum : metathorax conspicuus : abdomen ovatum, planum, thorace brevius : pedes simplices ; tarsi articuli 1^o ad 3^{um} curtantes, 4^{us} longior ; protarsis articulus 1^{us} brevissimus : alæ angustæ ; nervus ulnaris humerali longior, radialis nullus, cubitalis crassus in alæ discum abrupte declivis.

Fem. Capitis vertex latus : oculi parvi : antennæ extrorsum crassiores, corporis dimidio paullo longiores ; articuli 3^{us} et 4^{us} æquales ; clava fusiformis, acuminata, articulo 4^o duplo longior : abdomen thorace vix brevius.

Sp. 22. *Cirr. Eudora*, Mas et Fem. *Viridis aut cupreus, antennæ nigræ, pedes virides, tarsi fulvi, alæ limpide.*

Mas. Viridis : oculi et ocelli rufi : antennæ nigræ ; articuli 1^{us} et 2^{us} virides : thoracis discus æneus : abdominis discus nigro-æneus : pedes virides ; trochanteres fulvi ; genua fulva ; protarsi fusci ; meso- et metatarsi fulvi, apice fusci : alæ sublimpidæ ; squamulæ piceæ ; nervi fusci.

Fem. Viridi-æneus : antennis articuli 1^{us} et 2^{us} ænei : thoracis discus cupreus : abdomen viride cupreo-varium : pedes ænei : trochanteres rufi ; tibiæ fusæ, apice flavæ, tarsi flavi, apice fusci ; protarsi fulvi. (Corp. long. lin. 1— $\frac{3}{4}$; alar. lin. $\frac{1}{2}$ — $\frac{3}{4}$.)

Var. β. Mas.—Thorax cyaneo-viridis : scutelli discus cupreus : tibiæ fusæ.

Var. γ. Mas.—Thorax cyaneo-viridis cupreo-varius : abdomen basi viridi-cyaneum.

Var. δ. Mas.—Cupreus : meso- et metatarsi fusci.

Var. ε. Fem.—Tibiæ æneæ, apice et basi fulvæ ; protarsi fusci ; meso- et metatarsi fulvi, apice fusci.

Var. ζ. Fem.—*Var. ε.* similis : caput viride : thorax cupreus : abdomen viridi-cupreum.

Var. η. Fem.—*Var. ζ.* similis : scutellum apice viride.

Var. θ. Fem.—Cupreus : caput et abdomen cupreo-viridia : tibiæ æneæ ; meso- et metatarsi fusci, basi fulvi.

Var. ι. Fem.—*Var. ε.* similis : thorax æneo-viridis : abdomen nigro-æneum, basi et apice viride.

Var. κ. Fem.—*Var. θ.* similis : corpus omnino cupreum.

Found near London.

Mas. Corpus sublineare, læve, nitens, parce hirtum : caput transversum, breve, convexum, juxta thoraci latum ; vertex angustus : oculi sat magni : antennæ subsetaceæ, corporis dimidio multo longiores ; articulus 1^{us} gracilis, sublinearis ; 2^{us} longicyathiformis ; 3^{us} et sequentes ad 5^{um} fere æquales ; clava longifusiformis, apice attenuata et acuminata, articulo 5^o plus duplo longior : thorax longiovatus, convexus : prothorax mediocris, transversus, antice angustior : mesothoracis scutum longitudine vix latius ; parapsidum suturæ bene determinatæ ; scutellum obconicum : metathorax conspicuus : petiolus brevissimus : abdomen ovatum, planum, thorace brevius : pedes simplices ; tarsi articuli 1^o ad 3^{um} curtantes, 4^{us} longior ; protarsis articulus

1^{us} brevissimus: alæ angustæ; nervus ulnaris humerali longior, radialis nullus, cubitalis crassus, in alæ discum abrupte declivis.

Sp. 23. Cirr. Procles, Mas. *Æneo-viridis, abdomen nigro-cupreum, antennæ nigræ, pedes virides, tarsi fusi, alæ sublimpidæ.*

Æneo-viridis: oculi et ocelli rufi: antennæ nigræ; articuli 1^{us} et 2^{us} viridiceni: abdomen nigro-cupreum: pedes virides; trochanteres ferruginei; genua ferruginea; protarsi obscure fulvi: meso- et metatarsi fusi, basi et subtus fulvi. alæ sublimpidæ, squamulæ picæ; nervi fusi. (Corp. long. lin. $\frac{2}{3}$; alar. lin. $\frac{3}{4}$.)

Found near London.

Mas. Corpus sublineare, nitens, leve, parce hirtum: caput transversum, breve, convexum, juxta thoraci latum; vertex latus: oculi parvi: antennæ subfiliformes, hirtæ, corporis dimidio multo longiores; articulus 1^{us} gracilis, sublinearis; 2^{us} longicyathiformis; 3^{us} et sequentes longi, lineares; clava fusiformis, apice attenuata et acuminata: thorax longiovatus, convexus: prothorax mediocris, transversus, antice angustior: mesothoracis scutum longitudine vix latius; parapsidum suturæ bene determinatæ; scutellum obconicum: metathorax conspicuus: petiolus brevissimus. abdomen ovatum, planum, thorace brevius: pedes mediocres, simplices, subæquales; tarsis articuli 1^o ad 3^{um} curtantes, 4^{us} longior; ungues et pulvilli sat magni; protarsis articulus 1^{us} brevissimus: alæ angustæ; nervus ulnaris humerali longior, radialis nullus, cubitalis crassus, in alæ discum abrupte declivis.

Sp. 24. Cirr. Abastor, Mas. *Iridis, abdomen cupreum, antennæ nigræ, pedes ferrugini, femora viridia, alæ fusæ.*

Læte viridis: oculi et ocelli rufi: antennæ nigræ; articuli 1^{us} et 2^{us} nigro-virides: abdomen nigro-cupreum; basi viride micans: pedes ferrugini; coxæ virides; trochanteres fusi, apice et basi flavi; femora viridia, apice flava; tarsi apice fusi; protarsi pallide fusi: alæ fusæ; squamulæ supra virides; nervi fusi. (Corp. long. lin. $\frac{1}{2}$; alar. lin. $\frac{1}{3}$.)

Found near London.

Fem. Corpus sublineare, nitens, scitissime squameum, parce hirtum: caput transversum, breve, convexum, juxta thoraci latum; vertex angustus; frons abrupte declivis: oculi sat magni: antennæ clavatæ, corporis dimidio paullo longiores; articulus 1^{us} gracilis, sublinearis; 2^{us} longicyathiformis; 4^{us} 3^o brevior; clava longiovata, acuminata, articulo 4^o duplo longior: thorax ovatus, convexus: prothorax brevis, antice angustior: mesothoracis scutum longitudine vix latius; parapsidum suturæ bene determinatæ; scutellum obconicum; metascutellum parvum, transversum: metathorax conspicuus: petiolus brevissimus: abdomen ovatum, planum, thorace vix brevius; segmentum 1^{um} sat magnum, 2^{um} et sequentia breviora. pedes mediocres, simplices, subæquales; tarsis articuli 1^o ad 3^{um} curtantes, 4^{us} longior; ungues et pulvilli sat magni; protarsis articulus 1^{us} brevissimus: alæ angustæ, breviter ciliatæ; nervus ulnaris humerali longior, radialis nullus, cubitalis crassus in alæ discum abrupte declivis, stigma minutum.

Sp. 25. Cirr. Aratus, Fem. *Viridis cupreo-varius, antennæ nigræ, pedes flavi, femora viridia, alæ sublimpidæ.*

Læte viridis: oculi et ocelli rufi: antennæ nigre; articulus 1^{us} nigro-viridis: thoracis discus cupreo-varius; mesothoracis scutellum cupreum: abdominis discus cupreo-viridis; pedes flavi; coxæ virides; femora viridia, apice flava; tarsi apice fusi; protibiæ extus fulvæ; protarsi fusi: alæ sublimpidæ; squamulæ fulvæ; nervi fulvi. (Corp. long. lin. $\frac{1}{2}$ — $\frac{3}{4}$; alar. lin. $\frac{1}{4}$ —1.)

Var. β.—Caput postice cupreum: scutellum apice viride micans: abdominis discus cupreus.

Var. γ.—Meso- et metatibiæ fulvæ.

Var. δ.—Caput cupreo-varium: thoracis discus cupreus; abdomen viride; segmenta basi cuprea.

Var. ε.—Pro- et mesopedum tibiæ pallide fuscæ: metatibiæ fulvæ: meso- et metatarsi fulvi, apice fusi.

Var. ζ.—*Var. ε.* similis: tibiæ omnes fulvo-fuscæ.

June, near London.

Fem. Corpus sublineare, læve, nitens, parce hirtum: caput transversum, breve, convexum, juxta thoraci latum, vertex angustus: oculi sat magni: antennæ subsetaceæ, corporis dimidii vix longitudine; articulus 1^{us} gracilis, sublinearis; 2^{us} longicyathiformis; 3^{us} et sequentes longi, lineares, usque ad 7^{um} decrescentes: thorax longiovatus, convexus: prothorax medioeris, transversus, antice angustior: mesothoracis scutum longitudine vix latius; parapsidum suturæ bene determinatæ; scutellum obconicum: metathorax conspicuus: petiolus brevissimus: abdomen ovatum, planum, thorace latius, vix brevius: pedes simplices; tarsi articuli 1^o ad 3^{um} curtantes, 4^{us} longior; protarsis articulus 1^{us} brevissimus: alæ angustæ; nervus ulnaris humerali longior, radialis nullus, cubitalis brevis ad alæ apicem propensus.

Sp. 26. *Cirr. Lagus, Fem. Cupreus viridi-varius, antennæ nigre, pedes ænei, tarsi flavi, alæ limpidæ.*

Cupreus: oculi et ocelli rufi: antennæ nigre; articuli 1^{us} et 2^{us} virides: mesothoracis scutellum apice viride: abdominis discus viridi-cyaneus: pedes ænei; trochanteres ferruginei; genua ferruginea; tibiæ æneo-picæ, apice flavæ; tarsi flavi, apice fusi; protarsi pallide fusi: alæ limpidæ; squamulæ picæ; nervi pallide fusi. (Corp. long. lin. $\frac{1}{2}$ —1; alar. lin. $\frac{1}{4}$ —1.)

Var. β.—Thorax viridis; discus cupreus: abdomen viride, cupreo varium.

Var. γ.—*Var. β.* similis: abdomen supra cupreum.

Var. δ.—Viridis: abdominis discus nigro-æneus.

Var. ε.—*Var. β.* similis: mesothoracis scutellum læte cupreum.

Var. ζ.—Læte viridis cupreo-varius: scutellum et abdomen cuprea: genua pallide flava; tibiæ fulvæ, apice flavæ.

Var. η.—*Var. ζ.* similis: abdomen viride; discus cupreus.

Var. θ.—Cupreus: antennis articuli 1^{us} et 2^{us} cuprei; abdominis discus nigro-cupreus.

August; near London.

Var. ι.—Nigro-cupreus: antennis articulus 1^{us} nigro-æneus: abdomen æneo-cupreum; discus nigro-æneus: pedes fulvi; coxæ nigro-æneæ; femora nigro-ænea; tibiæ fuscæ, apice et basi fulvæ; tarsi apice fusi.

August; near London.

See vol. 2. p. 198

LI.—*Floræ Insularum Novæ Zelandiæ Precursor; or a Specimen of the Botany of the Islands of New Zealand.* By ALLAN CUNNINGHAM, Esq.

[Continued from p. 381.]

POLYGONEÆ, Juss.

1. POLYGONUM, L.

355. *P. (Helxine) australe*; caule arboreo, ramis flexuosis scabriusculis, foliis ovato-cordatis acuminatis obtusis integerrimis lævibus, racemis axillaribus terminalibusque compositis. *Endl. Prodr. Fl. Nonf.* p. 42. *A. Rich. Fl. Nov. Zel.* p. 178.—*Coccoloba australis. Forst. Prodr. n.* 176. *Willd. Sp. Pl.* 2. p. 457. *Puka Incolarum.*

New Zealand (Middle Island), Dusky Bay.—1773, *G. Forster*.—Cook's Strait.—1827, *D'Urville*. (Northern Island), Bay of Islands, on the Keri Keri River.—1834, *R. Cunningham*.

Obs. Folia polymorpha, in eodem ramis cordata acuminata et basi æqualia ac obtusa; unde nequaquam duplex varietas quemadmodum. *A. Rich. loc. cit.* innuit, erit admittenda. *Endl.*

356. *P. adpressum, Br. Prodr.* 1. p. 420. *Labill. Nov. Holl.* 1. p. 99. *t.* 127. *Bot. Mag. t.* 3145. *Hernan, incol.*

New Zealand (Northern Island). In thickets on the banks of rivers, Wangaroa, Kana-Kana, &c.—1826, *A. Cunningham*. Bay of Islands.—1834, *R. Cunningham*.

357. *P. complanatum*, glabrum dumosum, caule fruticoso flexuoso, foliis (semuncialibus) subrotundis petiolatis subcordatis margine integerrimis, racemis axillaribus terminalibusve, floribus polygamis? ramulis volubilibus implexis scabris.

New Zealand (Northern Island), sandy shores of the Bay of Islands, where it forms dense bushes.—1826, *A. Cunningham*.

358. *P. prostratum, Br. Prodr.* 1. p. 419. *Rich. Fl. Nov. Zel.* p. 177.—Var. caule rectinato glabro.—Tutu naoué, Incol. (*D'Urville*.)

New Zealand (Northern Island). In low humid spots, Wangaroa.—1826, *A. Cunningham*. Bay of Islands.—1827, *D'Urville*.

2. RUMEX, L.

359. *R. crispus, L.—Campol. Monog. Enum.* p. 95. *A. Rich. Fl. Nov. Zel.* p. 177.—*Engl. Bot. t.* 1998.—*Poon, incol.*

New Zealand (Middle Island), Astrolabe Harbour.—1827, *D'Urville*.

Obs. Valvulis nudis cordato-orbiculatis integerrimis.

360. *R. Brownianus. Camp.* p. 81. *Schult. Syst. Veg.* 7. p. 135.—*R. fimbriatus. Br. Prodr.* 1. p. 421. *Smith in Rees' Cycl. n.* 19.—*R. flexuosus Sol. Mss. Forst. Prodr. n.* 515?

New Zealand (Northern Island). In low situations, in the Valley of Wangaroa.—1826, *A. Cunningham*. Wytangy and Keri-Keri Rivers.—1834, *R. Cunningham*.

Obs. Valvulis nudis venosis ovato-acuminatis pulchre fimbriatis.

CHENOPODEÆ, DC. R. Br.

1. CHENOPODIUM, L.

361. *C. triandrum*. Forst. Prodr. n. 129. Willd. Sp. Pl. v. 1. p. 1299. A. Rich. Fl. Nov. Zel. p. 180. Ræm. et Schult. Syst. Veg. 6. p. 252. Poipapa, Incol. (D'Urville.)

New Zealand (Middle Island), Astrolabe Harbour.—1827, D'Urville.—1773, G. Forster. (Northern Island), Bay of Islands.—1834, R. Cunningham.

362. *C. Botrys*. Willd. Sp. Pl. 1. p. 1304. Fl. Græc. t. 253.

New Zealand (Northern Island), sandy shores of the Bay of Islands.—1834, R. Cunningham.

363. *C. glaucum*. Willd. Sp. Pl. 1. p. 1305. Engl. Bot. t. 1451.

New Zealand (Northern Island), shores of the Bay of Islands, 1831.—R. Cunningham.

364. *C. maritimum*. Willd. Sp. Pl. 1. p. 1307. A. Rich. Fl. Nov. Zel. p. 181. Engl. Bot. t. 663.

New Zealand (Middle Island), salt marshes, Astrolabe Harbour.—1827, D'Urville.

365. *C. fruticosum*. Schrad. Ræm. et Sch. Syst. Veg. 6. p. 265.—*Sal-sola fruticosa*, L. Forst. Prodr. n. 131. Willd. Sp. Pl. 1. p. 1316. A. Rich. Fl. Nov. Zel. p. 182. Engl. Bot. t. 635.

New Zealand.—1773, G. Forster.

2. SALICORNIA, L.

366. *S. indica*, Willd. Br. Prodr. 1. p. 44. A. Rich. Fl. Nov. Zel. p. 182.—*S. australis*. Sol. Mss. Forst. Prodr. n. 487.

New Zealand (Middle Island), shores of Astrolabe Harbour.—1827, D'Urville. (Northern Island) on rocks washed by the sea, Bay of Islands.—1834, R. Cunningham.

AMARANTHACEÆ, Juss.

ALTERNANTHERA, Forshal.

367. *A. denticulata*. Br. Pr. 1. p. 417. Ræm. et Sch. Syst. Veg. 5. p. 556. Nahuwie, Incol.

New Zealand (Northern Island). A procumbent plant, growing in bogs and open marshy grounds. Bay of Islands.—1834, R. Cunningham.

Obs. Closely allied to *A. prostrata*, Don. (Prodr. Fl. Nep.); but that species differs in having the foliola of the perianth nearly as short as the utriculus.

PARONYCHICÆ, St. Hil. Juss. DC.

(SCLERANTHÆ, Link, Lindl.)

MNIARUM, Forst. Br.

368. *M. biflorum*, Forst. Gen. t. 1. Linn. Suppl. 18. Br. Prodr. 1. p. 412. De Cand. Prodr. 3. p. 378. A. Rich. Fl. Nov. Zel. p. 319.—*M. pedunculatum*, Labill. Nov. Holl. 1. p. 8. t. 2.—*Ditoca muscosa*, Banks et Sol. Ms. Gærtn. Koku-Koku Incol. insulæ septentrionalis, R. Cunningham.—*Nae-réoré*, Indig. ins. mediæ. D'Urville.

New Zealand (Middle Island), Astrolabe Harbour.—1827, D'Urville.—(Northern Island).—1769, Sir Jos. Banks. On dry banks among fern,

1834, *R. Cunningham*. Rocky head of Wangaroa Harbour.—1826, *A. Cunningham*.

PLANTAGINEÆ, *Juss.*

PLANTAGO, *L.*

369. *P. major*. *L. Willd. Sp. Pl.* 1. p. 641. *Ræm. et Sch. Syst. Veg.* 3. p. 111. *A. Rich. Fl. Nov. Zel.* p. 184. *Engl. Bot.* t. 1558.

New Zealand (Northern Island). Banks of the river Thames.—1827, *D'Urville*.

370. *P. varia*. *Br. Prodr.* 1. p. 424. *Ræm. et Sch. Syst. Veget.* 3. p. 150.

New Zealand (Northern Island). Between the villages of Ngaire and Wainai, on the east coast, upon dry banks near the sea-shore.—1834, *R. Cunningham*.

PRIMULACEÆ, *Ventenat.*

1. ANAGALLIS, *L.*

371. *A. arvensis*, *L. Willd. Sp. Pl.* v. 1. p. 821. *Engl. Bot.* t. 529.—*A. phænicea*, *Lam. DC. Fl. Franc.*

New Zealand (Northern Island), among fern, far from any European settlement.—1834, *R. Cunningham*. Perhaps scarcely indigenous.

2. SAMOLUS, *L.*

372. *S. littoralis*. *Br. Prodr.* 1. p. 428. *A. Rich. Fl. Nov. Zel.* p. 185. *Ræm. et Sch. Syst. Veg.* v. 5. p. 1. *Endl. Prodr. Fl. Norf.* p. 48.—*Sheffieldia repens*. *Forst. Prodr. n.* 67. *Makouko*, Incol. *D'Urville*.

New Zealand (Middle Island).—1773, *G. Forster*. Astrolabe Harbour.—1827, *D'Urville*. (Northern Island). On rocks washed by the sea, Bay of Islands, &c.—1826, *A. Cunningham*.—1834, *R. Cunningham*.

SCROPHULARINEÆ, *R. Br.*

1. VERONICA, *L. Juss.*

373. *V. speciosa* (*R. C. Mss.*) glaberrima, racemis terminalibus brevibus erectis confertifloris, bracteis ovato-lanceolatis pedicelli dimidio brevioribus, laciniis calycinis ovatis acutiusculis tenuissime ciliatis dimidium tubi corollæ subæquantibus, foliis (oppositis) planis obovatis obtusis coriaceis decurrentibus, apiculo calloso obtuso marginibus integerrimis incrassatis coloratis, caule fruticoso erectiusculo vel diffuso. *All. Cunn. in Bot. Mag. sub* t. 3461.

Napuka ab indigenis vulgo vocatur.

New Zealand (Northern Island). South head of the river Hokianga, West Coast.—1834, *R. Cunningham*.

Frutex spectabilis, 3—6-pedalis, caulibus pluribus robustis adscendentibus. *Folia* 3—4-pollicaria. *Flores* speciosi, cyaneo-violacei, fere facie *Lysimachia atropurpureæ*. *Stamina* exserta pistillum æquantia. *Capsula* bipartibilis, elliptica, acuminata, glabra, calyce duplo longior.

374. *V. salicifolia*. *Forst. Prodr. n.* 11. *Vahl. Symb.* 3. p. 4. *Ræm. et Sch. Syst. Veg.* 1. p. 103. *A. Rich. Fl. Nov. Zel.* p. 186. *Endl. in Ann. des Wien. Mss. band 1. App.* t. 14. *Kolokian*, Incol. *Med. Ins. D'Urville. Korokio*, Indig. ad flum. Hokianga, *R. Cunningham*.

New Zealand (Middle Island).—1773, *G. Forster*. Shores of Astrolabe Harbour.—1827, *D'Urville*. (Northern Island.) On the skirts of dense humid forests near Hokianga River.—1826, *A. Cunningham*.—1834, *R. Cunningham*.

Arbuscula 10—15-pedalis, *A. C.* (2—3-orgyalis ex *Forstero*), ramosa, rami elongati, graciles, glabri. *Folia* opposita, decussata, palmaria, linearilanceolata, acutissima, integra; petioli vix ulli basi dilatati semi-amplexicaules. *Flores* albido-cærulescentes, spicati. *Spicæ* elongatæ, axillares, folio longiores. *Corollæ* tubus longitudine calycis. *Stamina* exserta. *Cap-sula* bilocularis, lævis, calyce duplo longior.

375. *V. ligustrifolia*; racemis pedunculatis terminalibus pubigeris folium subæquantibus, bracteis oblongo-lanceolatis pedicello duplo brevioribus, laciniis calycinis ovato-lanceolatis acutiusculis longitudine tubi corollæ, foliis (oppositis) ovali-oblongis angusto-lanceolatisve obtusiusculis integerrimis glabris, caule fruticoso. *All. Cunn. in Bot. Mag. sub t. 3461.*

New Zealand (Northern Island). In close woods on the hills in the vicinity of the Bay of Islands.—1833, *R. Cunningham*.

Frutex gracilis, bipedalis. *Folia* ovalia, vel attenuato-lanceolata, sessilia. *Flores* albidæ, spicato-racemosi. *Calyx* persistens, laciniis æqualibus. *Corollæ* laciniæ acutiusculæ.

376. *V. macrocarpa*. *Vahl. Symb. 3. p. 4. Ræm. et Sch. Syst. Veg. 1. p. 103.*

New Zealand, *Vahl*.

Frutex glaber. *Folia* quadripollicaria, lanceolata, integerrima, enervia. *Racemi* erecti, laterales, longitudine foliorum. *Calyx* parvus. *Corollæ* tubus calyce duplo longiore, limbi laciniis obtusis. *Cap-sula* ovata, acuta, calyce triplo longior.

377. *V. angustifolia* (*Rich.*) spicis gracilibus pedunculatis axillaribus folio duplo et ultra longioribus, pedunculo puberulo, laciniis calycinis obtusis tubo corollæ duplo brevioribus, foliis (oppositis) lineari-angustis acutis integris glabris glaucescentibus, caule ramoso fruticoso. *A. Rich. Fl. Nov. Zel. p. 187.*

New Zealand (Middle Island). North Coast, "Bassin des Courans, Passe des Français," &c. on the sea-coast.—1827, *D'Urville*.

Suffrutex bi-tri-pedalis, ramosus. *Folia* vix biuncialia. *Flores* cærulescentes, spicati. *Calyx* persistens, laciniis inæqualibus ciliatis. *Corollæ* laciniis obtusis.

378. *V. parviflora*. *Vahl. Symb. 1. p. 67. Ræm. et Sch. Syst. Veget. 1. p. 103.*

New Zealand.

Obs. *Caulis* fruticosus. *Folia* sessilia, approximata, linearilanceolata, rigida, mucronata, glabra, integerrima, pollicaria. *Racemi* sesquipollicares, erecti. *Bractææ* minutæ. *Corollæ* laciniis obtusis. *Cap-sula* ovata, calyce tetraphyllo duplo longior.

379. *V. elliptica*. *Forst. Prodr. n. 10. Ræm. et Sch. Syst. Veg. 1. p. 104. A. Rich. Fl. Nov. Zel. p. 189.*

New Zealand (Middle Island).—1773, *G. Forster*.

Caules fruticosi, ramosi, biorgyales. *Folia* elliptica (*Daphnis*) subpetiolata, opposita, decussata, glabra, avenia, apice obtusa, integerrima, pollicaria. *Racemi* (spicæ) axillares, laxe pauciflori. *Lacinia calycis* subulatæ, tubo corollæ duplo breviores. Filamenta staminum corollæ longitudine.

380. *V. Catarractæ*. *Forst. Prodr. n. 9. Ræm. et Sch. Syst. Veg. 1. p. 104. A. Rich. Fl. Nov. Zel. p. 189.*

New Zealand (Middle Island).—1773, *G. Forster*.

Caulis suffruticosus, bipedalis, simplex, prostrato-adscendens, lævis. *Folia* lanceolata, serrata, petiolata, serraturis apice callosis. *Racemus* terminalis, flexuosus. *Calycis lacinia* lanceolatæ, acutæ. *Lacinia corollæ* subrotundæ, lateralibus majoribus. *Stam.* corolla breviora. *Capsula* inflata subrotundo-compressiuscula, calyce cincta. *Ex Forst.*

381. *V. diosmifolia*, (*R. Cunn. Mss.*), corymbis axillaribus terminalibusve multifloris bracteis ovatis pedicello duplo brevioribus, lacinii calycis ovalibus obtusis dimidium tubi corollæ æquantibus, foliis decussatis petiolatis lanceolatis acutis integerrimis serrulatisve serraturis simpliciter incisus remotis supra concavis lævibus subtus discoloribus, caule fruticoso erecto. *A. Cunn. in Bot. Mag. sub fol. 3461. Piriti, Incolis.*

New Zealand (Northern Island). In dense thickets at the head of the Wyceldy River, and at the fall of the Keri-Keri River, Bay of Islands.—1834, *R. Cunningham*.

Frutex gracilis, virgatus, 3—12-pedalis, cum habitu omnino *Trachymenes*. *Rami* stricti, erecti, foliosi. *Folia* 9 lineas longa, avenia, subtus carinata. *Flores* albi. *Capsula* elliptica, acuta, compressa, bipartibilis, calyce ciliato triplo longior.

382. *V. calycina*, racemis lateralibus pedunculatis paucifloris strictis folio multoties longioribus, foliis late ovatis subcordatis rugosis inæqualiter serrato-crenatis petiolatis cauleque hirsutis, calycibus pilosis ciliatis capsula longioribus. *A. Cunn. in Bot. Mag. sub t. 3461. Br. Prodr. Fl. Nov. Holl. 1. p. 435. Ræm. et Sch. Syst. Veg. 1. p. 119.*

New Zealand (Northern Island). Banks of the Keri-Keri River, in grassy places.—1834, *R. Cunningham*.

Caulis herbaceus, elongatus (sæpe 5—6-pedalis), in locis graminosis late repens vel decumbens. *Folia* opposita grosse dentata, subtus discoloria, hispida. *Calyx* quadripartitus, capsula longior, lacinii obovatis obtusiusculis nervosis. *Capsula* rotundata, compressa, emarginata, seu obcordata, polysperma, dissepimento contrario.

2. GRATIOLA, L.

383. *G. sexdentata*, (*R. Cunn. Mss.*), caule glabro procumbente ramoso, foliis ovato-lanceolatis sessilibus extra medium paucidentatis pedunculum æquantibus, lacinii calycinis lineari-lanceolatis obtusis capsula subemarginata longioribus.

New Zealand (Northern Island). In bogs at Manga-muka on the Hokianga River; also between the Waimate and Keri-Keri Rivers.—1834, *R. Cunningham*.

3. EUPHRASIA, L.

384. *E. cuneata*; corollæ lacinii inferioribus truncatis, calycibus obtusi-

usculis glabris capsula duplo brevioribus, spica multiflora, foliis cuneatis obtusis crassiusculis, hinc illinc lateribus 1—2-dentatis, caule ramoso scabro. *Forst. Prodr. n. 234. H. Rich. Fl. Nov. Zel. p. 191. Rata, Incolis. D'Urville.*

New Zealand (Northern Island). On rocks upon the sea-coast, Tolaga Bay (Lat. 38° 22' S.)—1769, *Sir Jos. Banks.*—1827, *D'Urville.*

CYRTANDRACEÆ, *Jack in Linn. Tr. v. 14. p. 23.*

RHABDOTHAMNUS.

Calyx ovario basi adnatus, profunde 5-fidus, subbilabiatu. *Corolla* tubulosa, bilabiata (sen limbo quinque-lobato), labio superiore bilobo, inferiore trilobo subæquali. *Stamina* quatuor, didynamia, et quinti rudimentum. *Antheræ* omnes in discum lobatum cohærentes. *Annulus hypogynus* carnosus. *Stylus* longitudine staminum. *Stigma* bilamellatum. *Capsula* sicca (venosa) rostrata, unilocularis, bivalvis, valvis medio fissis, marginibus valvularum inflexis, *placentis* duabus lanceolato-lamellatis pedicellatis parietalibus demum liberis. *Semina* numerosa. *Frutex ramosissimus, dumosus, virgatissimus, ramulis gracilibus pallidis pilosis.* Flores tubulosi, striati, sordide rubri seu rubiginosi. *Calyx* tubulosus, persistens. Folia subrotundo-rhomboidæa, subcuneata, petiolata, scabra, grosse serrata, venosa. Pedunculus uniflorus.

Obs. Nomen genericum e Græcis vocabulis *ράβδος* virga, et *θάμνος* frutex, ob virgatissimum fruticis habitum.

385. *R. Solandri.*—Columnæ scabrosa. *Sol. Mss. in Bibl. Banks.*

New Zealand (Northern Island).—1769, *Sir Jos. Banks.* In dry woods, in the vicinity of the Bay of Islands. Wangaroa, &c.—1826, *Allan Cunningham.*—1834, *Richard Cunningham.*

SOLANEÆ, *Juss.*

SOLANUM, *L.*

386. *S. laciniatum.* *Hort. Kew. ed. 1. Br. Prodr. 1. p. 445. non Ruizii. Ræm. et Sch. Syst. Veg. 4. p. 578. Curt. Bot. Mag. t. 349. Willd. Sp. Pl. 1. p. 1030, et Enum. Pl. 1. p. 284.*—*S. aviculare, Forst. Prodr. n. 107. A. Rich. Fl. Nov. Zel. p. 193.*

New Zealand. In damp woods. Cook's Strait.—1773, *G. Forster.* (Northern Island.)—1769, *Sir Jos. Banks.* Bay of Islands.—1826, *A. Cunningham.* Poro-Poro, Incol. *D'Urville.*

Some botanists, and, among them, Dunal and A. Richard, doubt the identity of the plant of *Hortus Kewensis* and that of Forster. The latter says of the plum-like fruit of *S. aviculare*, which Cook's sailors ate when they observed that the birds did not refuse them, "hujus baccæ fulvæ, pruni majoris magnitudine, acidæ, parum dulcescentes, subnauseosæ, ab Incolis Novæ Zelandiæ avide vorantur, aviculis etiam gratissimæ, neque nostratibus omnino rejiciendæ."

Solanum tuberosum, *L.*, is enumerated by A. Richard in his 'Flora,' p. 194, although admitted to be a plant introduced by Europeans, and now generally cultivated by the natives, who call it *Tihon*.

MYOPORINÆ, R. Br.

1. MYOPORUM, Banks and Sol.—R. Br.

387. *M. lætum*, Forst. Prodr. n. 238. Willd. Sp. Pl. Pers. Syn. 2. p. 144. A. Rich. Fl. Nov. Zel. p. 195.—*Citharexylon perforatum*, Forst. Mss. conf. Steud. nom.

New Zealand (Middle Island).—1773, G. Forster. (Northern Island.) Rocky shores of the Bay of Islands—1826, A. Cunningham.

388. *M. pubescens*, Forst. Prodr. p. 239. Willd. Pers. Syn. 2. p. 141.

New Zealand (Middle Island).—1773, G. Forster.

2. AVICENNIA, L.

389. *A. tomentosa*, L. Br. Prodr. 1. p. 518. Willd. Sp. Pl. 3. p. 395.—*A. resinifera*, Forst. Prodr. n. 216. A. Rich. Fl. Nov. Zel. p. 195.

Manaoa, D'Urville. *Manaoa* ab incolis dicitur, R. Cunningham.

New Zealand, on the immediate shores of both the Northern and Middle Islands.

Obs. I. This tree is the *Mangrove* of New Zealand, of which Forster says, to justify his name, "Gummi ex hac arbore exsudans forte idem est, quo barbari Novæ Zelandiæ homines vescuntur, ut patet e diario navarchi gallici Crozet (p. 67. *Voyage de M. Marion*)."

Obs. II. M. Ach. Richard insists that Forster's plant, which that voyager believed had produced a gum which the French observed the natives using as a masticatory, is different from the Linnæan species, notwithstanding that Mr. Brown, upon comparing authentic specimens in the Banksian Herbarium, had seen no ground to separate them. Richard's characters are as follow: *A. resinifera*, Forst., corollæ laciniis acutis glabris. *A. tomentosa*, L., corollæ lobis obtusis emarginatis villosis.

VERBENACEÆ, Juss.

1. VITEX, L.

390. *V. littoralis*: foliis ternatis quinatisve, foliolis ellipticis obtusis cum acumine petiolatis glabris, paniculis brevibus racemosis axillaribus terminalibusve, ramis dichotomis, calyce campanulato subdentato, staminibus exsertis, corolla extus tomentosa.—*Ephialis pentaphylla*. Banks et Sol. Mss. et Ic. ined. in Biblioth. Banks. *Puredi s. Puriri*, incol. A. Cunningham.

New Zealand (Northern Island).—1769, Sir Jos. Banks.—1826, A. Cunningham. A tree of very irregular growth on the rocky shores of the Bay of Islands, growing frequently within the range of salt water.

That able missionary, the Rev. W. Yate, observes that "this tree from its hardness and durability has been denominated the New Zealand Oak, and indeed it seems to answer all the purposes of that prince of trees. The wood is of a dark brown colour, close in the grain, and takes a good polish; it splits freely, works well, and derives no injury from exposure to the damp, twenty years' experience having proved that in that period it will not rot, though in a wet soil

and underground. For ship building it is (like the teak, which belongs to the same order) a most valuable wood ; as the injury which it has received from being perforated in various places, by a large grub peculiar to the tree, does not essentially diminish its value for the timbers of ships or for the knees of boats. It grows from fifteen to thirty feet without a branch, and varying from twelve to twenty feet in circumference."

✧ LABIATÆ, Juss.

MICROMERIA, Bentham.

Calyx tubulosus, 13 rarius sub-15-striatus, 5-dentatus. *Corollæ* tubus æqualis, rectus ; limbus bilabiatus, labium superius integrum vel emarginatum. *Stamina* 4, didynama, inferiora longiora adscendentia, apice perparia approximata, vel rarius subdivergentia. *Antheræ* liberæ, biloculares.

391. *M. Cunninghamii*, (Benth.) caule herbaceo prostrato tenuiter pubescente, foliis petiolatis rotundatis subintegerrimis, pedicellis elongatis nudis, calycibus hirsutis, dentibus ovato-lanceolatis, fauce intus nuda. *Benth. Lab. Gen. and Sp. Suppl.* p. 730.—Thymi species. *R. C. Mss.*

New Zealand (Northern Island). At Manga Muka, on the Hokianga river.—1834, *R. Cunningham*.

Obs. *Calyx* magnitudine *M. Douglasii* et pari modo post anthesin ovato-globosus. *Dentes* intus villosi, sed faux nuda. *Corolla* tubo incluso, magnitudine et forma *M. satureoides* et *australis*. (*Menthæ* sp. *R. Br.*)

A very remarkable species as belonging to the American section *Hesperothymus*, and indeed very nearly allied to *M. Brownei* (*Thymus Brownei*, Swartz) a West Indian and South American plant. *Benth. in litt.*

BORAGINÆ, Juss.

1. ANCHUSA, L.

392. *A. spathulata*, caule filiformi procumbente, foliis petiolatis ovatis obtusis piloso-hispidis distantibus, pedicellis laterifoliis solitariis, nucibus lævibus. *Ræm. and Sch. Syst. Veg.* iv. p. 100.—*Myosotis spathulata*. *Forst. Prodr.* n. 62. *Willd. Sp. Pl.* 1. p. 748. *A. Rich. Fl. Nov. Zel.* p. 198.

New Zealand (Middle Island).—1778, *G. Forster*. Astrolabe Harbour, —1827, *D'Urville*. (Northern Island), dry rocky elevated spots. Wangaroa. —1826, *A. Cunningham*.

Obs. Veram esse *Anchusam* plantæ recentis indagator. *R. Br. Prodr.* p. 494.

2. MYOSOTIS, L.

393. *M. Forsteri*; foliis obovato-spathulatis strigoso-hispidis, racemis ebracteatis, pedicellis in fructu erecto-patentibus longitudine calycis, laciniiis calycis oblongis obtusiusculis trinerviis. *Lehm. Asper.* p. 95. *Ræm. and Sch. Syst. Veg.* iv. p. 779. *Endl. Syn. Fl. Insul. Occ. Austr. in Ann. des Wien. Mus.* Band i. p. 174. n. 1221.

New Zealand (Middle Island).—1773, *G. Forster*. *Endl.*

[To be continued.]

LII.—*Information respecting Botanical Travellers.*

WE are anxious to put our botanical readers in possession of some further particulars respecting Mr. Gardner's success in Brazil, and we shall, without any further preface, lay before them the following extracts from his Journal, which has been addressed to us in the form of letters, as a continuation of what has been already given at p. 165 of this volume of the 'Annals.' It was soon after he returned from the Organ Mountains to Rio that Mr. Gardner embarked for Pernambuco.

Pernambuco, Jan. 21, 1838.

In the following sheets I intend to give some account of my residence in this place, and of the general appearance of the country and nature of vegetation in such parts of the province as I have visited. You are aware that I landed at Pernambuco on the 9th of October. Land was descried early in the morning from the mast-head, and in the course of a few hours we could see it from deck, rising above the horizon like a long black cloud. On nearing the coast it presented a very flat and barren appearance, forming a great and unpromising contrast to the magnificent entry to the Bay of Rio de Janeiro. The town being built nearly on a level with the sea, we could only obtain a view of that portion which immediately skirts the shore. No part of the coast, within many leagues of Pernambuco, rises to any height, except that whereon the old town, called Olinda, stands, and which is situated about three miles north of Recife, which is the name of the sea-port. The first thing which attracts the attention of a stranger when entering the harbour of Pernambuco is the nature of the harbour itself. It is quite a natural one, being formed by a coral reef which runs along the coast at a little distance from the shore, and is entered through a breach in the reef, on the south side of which a light-house and small fort are built. However high may be the swell outside this reef there is always calm water within, which at full tide is sufficiently deep to float the largest merchant vessels which visit the port.

When I arrived I found Dr. Loudon waiting, who kindly invited me to remain in his house during my stay in the place. Shortly afterwards, having delivered the letters of introduction which I brought from Mr. Hamilton, the English minister at Rio, to Mr. Watts the British consul, the latter obligingly offered to introduce me to the President of this province, Senhor Vicente Thomaz Pires de Figueiredo Comargo, as soon as it could be ascertained when it would be convenient for him to receive us. The permission to wait upon

his excellency having been given a few days afterwards, Mr. Watts and myself proceeded to the palace, accompanied by Dr. Loudon, who is a personal friend of the President. He received us very kindly; and when Mr. Watts stated the object of my visit to the country, he promised to afford me all the assistance in his power, and desired me to call again the next day, when he would give me a letter to Dr. Serpa, the Professor of Botany and Curator of the Botanic Garden at Olinda.

For the first few days my walks extended but little beyond the suburbs of the town. The country is quite flat, and the soil very sandy; and as the dry season had commenced, the herbaceous vegetation on the more exposed situations was beginning to suffer for want of rain. For many miles round the town of Pernambuco the cocoa nut and other large palms grow in the greatest profusion, mixed with fine trees of *Anacardium occidentale* (the Cashew), then loaded with large yellow or reddish coloured fruits; with mangoes (*Mangifera indica*) which here attain a much larger size than at Rio, though still far from equalling those of Bahia; and the two species of bread fruit (*Artocarpus incisa* and *A. integrifolia*), the ends of the branches in the former and the trunks and main boughs of the latter supporting their monstrous fruits. More attention seems to be paid here than at Rio to the gardens which are attached to the houses near the town, many of them being adorned with beautiful flowering shrubs, chiefly of Indian origin. During my first walks I collected specimens of the following plants: *Turnera trioniflora*, which grows profusely in waste and cultivated spots, and by road sides, even decorating some of the less frequented streets with its large pale yellow flowers, which only expand during the early part of the day; and, in the same situations, a fine large blossomed species of *Richardsonia*, *Boerhaavia hirsuta*, and *Argemone mexicana*. In marshy places, which were beginning to be dried up, I found fine specimens of *Pontederia paniculata*, *Hydrolea spinosa*, and a small purple-flowered *Ammannia*. In spots which were either now under cultivation, or had once been so, grew *Elytraria tridentata*, a narrow-leaved *Stachytarpheta*, *Angelonia pubescens*, *Monniera trifolia*, a small *Eriocaulon*, several small *Leguminosæ*, and *Conoclinium prasiifolium*, DC. Where the ground was dry and among bushes I observed *Hirtella racemosa*, in great plenty and full bloom, together with a small frutescent *Malpighiaceus* plant, and *Jatropha urens*, and *J. gossypifolia*, the latter sometimes attaining the stature of a tree, and being not unfrequently used for hedges. The *Mimosæ* and the fences, as about Rio, are festooned with *Malpighiæ*, *Bignoniæ*, *Ipomææ* and *Leguminosæ*, of which the

cowitch plant (*Stizolobium urens*) was the most abundant, and, mingling in many places with a species of Dodder (*Cuscuta graveolens* ? of Kunth), which twines over the hedges with its long yellow cord-like branches, gives to the surrounding scenery a most singular appearance.

On the 21st of October I proceeded to visit Dr. Serpa and the Botanic Garden of Olinda, accompanied by a Mr. Nash, a young English gentleman, to whom I am indebted for many acts of kindness. There are three ways by which Olinda may be reached from Recife ; one is along the sea-shore, but, from the loose sandy nature of the soil, and the complete exposure of the traveller to the sun, this course is seldom taken ; another is to proceed in canoes up the river, by which the large freshwater lakes that are situated behind Olinda empty themselves into the sea. This stream runs almost parallel with the shore, from which it is separated by a high sand-bank. The third and last way was that which we pursued, namely, a road that keeps the inland side of the river, though at a considerable distance from it. This road is quite level, and at both ends are situated several fine country-houses, though much of it passes through waste and uncultivated land ; and a considerable portion is bounded by the lake. Occasionally *Mimosa* hedges inclose it, where I observed a great profusion of a small white-flowered *Jasminum*, which at the early hour when we passed was perfuming the air with its delightful fragrance, and a species of *Securidaca*, that, in similar situations displayed its large clusters of rich purple flowers. The road-side was gay with the pale yellow blossoms of *Turnera trioniflora* and the delicate pink heads of the sensitive plant (*Mimosa pudica*). Along its shore the lake was fringed with low shrubs, among which I observed *Anona palustris*, *Avicennia tomentosa* and *A. lucida*, *Laguncularia racemosa*, and a subarborescent kind of *Caladium*, while many parts of the water were yellow with the flowers of *Limnocharis Commersonii*, and of a large species of *Utricularia*. Towards Olinda I was delighted at finding the surface of the water covered with thousands of the splendid white blossoms and broad floating foliage of a water-lily (*Nymphæa ampla*, DC.).

Besides the letter that I carried to Dr. Serpa from the President, was another to Senhor Da Cunha, Professor of the French and English languages at Olinda ; and having called first on this gentleman, he expressed his regret that he could not accompany us to the garden, owing to his delicate state of health ; his looks indeed testifying a tendency to consumption.

The Botanic Garden is situated in a hollow, rather behind the
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town of Olinda, and if it were all under cultivation would be of considerable size. The residence of the Professor stands nearly in the centre; it is a small building, of a single story. We found Dr. Serpa in his study, a rather large apartment, which he also uses for a lecture room; and were impressed by the intelligent and agreeable manners of the old gentleman, who is perhaps above sixty years of age; and, besides his other duties, has the principal medical practice in the town of Olinda. A few French works on botany and agriculture compose the chief part of his very limited library; among them I observed a complete set of the *Flora Fluminensis*, by Padre Vellozo. He showed me also three volumes of original drawings of indigenous and exotic plants, executed by his sons in illustration of the Linnæan system; many of them, however, were incorrectly named; *Cicca disticha* for instance being called *Ribes Grossularia*.

Dr. Serpa then accompanied us in a walk round the garden, which contained little worthy of notice; a few European plants, struggling for existence, and some large Indian trees being its chief productions: among the trees, however, were fine specimens of mango, tamarind, and cinnamon. We afterwards proceeded to see a little of the neighbouring country, where I hoped to find something more interesting than within the precincts of the garden, and in this expectation I was not disappointed, having collected several species new to me, among them *Cuphea flava*, which is common in dry situations in this province, and a curious *Eriocaulon*. After visiting some of the churches, and the ruins of an old convent, now inhabited by a hermit, we returned in a canoe to Recife.

About a fortnight after my arrival at Pernambuco, Dr. Loudon removed to his country-house, situated on the banks of the Rio Capibaribe, about four miles west from Recife. The country round, being chiefly uncultivated, afforded ample scope for my researches. In a low marshy spot near the house I found a good many *Cyperaceæ* and *Gramineæ*, and great plenty of the curious *Pangatium indicum* (Lamarck); and in the same marsh, as well as along the banks of the river, are some large trees of *Avicennia nitida*, some of their stems measuring 5 feet in circumference, and rising unbranched to a height of more than 20 feet. Near the entrance of Dr. Loudon's house stands a large tree belonging to the natural order *Chrysobalanææ*, perhaps a species of *Moquilea* (No. 992 of this collection). The stem is of considerable thickness, quite straight, and rises undivided to the height of upwards of 35 feet; below it is much ribbed, and at the summit is crowned by a top not unlike that of an European beech; upon the whole it is one of the finest trees I have seen in this country, not

certainly for size, but for symmetry of form. It bears a yellow eatable drupe, about as big as a large yellow gooseberry. This fruit is called *Oyty*, and the tree itself *Oytycera*. Opposite the house, on the other side of the river, there extends a large tract of wooded country, consisting chiefly of small trees and shrubs, which have sprung up since the Virgin forests have been felled; it is called Mato de Torre. Between this wood and the river stretches a broad piece of open ground partly covered with short grass, and partly with low shrubs and herbaceous plants. The former consist of several species of *Solanum* and *Mimosa*, some *Myrtaceæ* and suffruticose *Vernoniæ*. Among the herbaceous plants I found beautiful specimens of the lovely *Angelonia salicuriæfolia*, and a large white-flowered *Cleome*. *Jatropha urens* and *J. gossypifolia* are also common in this tract, in the middle of which are some small freshwater lakes that afforded me some good plants. To my great delight the first excursion to this spot was rewarded with that curious aquatic fern, named after Mr. Parker of Liverpool, *Parkeria pteridioides*. The lower parts of the fronds are much inflated, by which the whole plant, being rendered specifically lighter than the water, floats upon the surface of the shallows; its long fibrous roots only reaching the mud at bottom. Along the borders of these lakes grow several large *Polygona*, one of them has stout spikes of greenish white flowers, and another considerably resembles our *P. amphibum*: there also abound *Pontederia paniculata*, *Hydrolea spinosa*, and a species of *Ammannia*. Several parts are covered with a floating turf, consisting principally of different *Cyperaceæ*; and where this does not exist, *Jussiea natans* throws along the surface of the water its long floating branches, which are upborne by numerous small white cylindrical bladders attached to the lower side. The flowers are white, and about the size of those of *Ranunculus aquatilis*, to which, at a distance, it bears a considerable resemblance. Mingled with the *Jussiea* are vast quantities of the curious *Azolla magellanica* and *Pistia Stratiotes*.

In the wood itself grow many species of *Myrtaceæ*, a few *Melastomaceæ*, and several fine trees of the Cashew; also a good many species of *Coccoloba*, and great abundance of *Vismia brasiliensis*, the latter often attaining the stature of a small tree, together with numerous *Byrsonimæ*. There are also several small trees of *Eschweilera parvifolia* (Martius), which when covered, as was then the case, with its curious pale-yellow flowers, presented a beautiful object. Twining among these and other trees I observed fine plants of *Gomphia acuminata*, the large panicles of golden blossoms contrasting most agreeably with the shining dark-green foliage; likewise a spe-

cies of *Trigonía*, and, particularly among the lesser trees by the bank of the river, a *Combretum*, with large clusters of small pale yellow and highly scented flowers.

On first entering this wood I was peculiarly struck by the difference of its general aspect from those of the same kind about Rio. Here everything betokened a dryer atmosphere and more arid soil. No ferns, *Begonia*, *Piperaceæ*, or orchideæous plants could be seen. On the stems and branches of the larger trees a few *Bromeliaceæ* and *Aroideæ* alone existed.

The Rev. Mr. Austin, the English clergyman here, having told me of a curious plant which grew in bushy places a few miles beyond his house, and kindly promised to accompany me thither, I started early with him one morning to procure some of it. On reaching the place where it grows, about ten miles west from Recife, I found it to be a noble *Epidendrum*, with stems more than 6 feet high, destitute of leaves at top, and bearing large corymbs of fine red flowers. It will probably prove to be *Epidendrum cinnabarinum* of Saltzman, first found by that botanist at Bahia. Whilst collecting specimens of a small leguminous plant, growing near the *Epidendrum*, I observed on the ground, under the shade of some low shrubs, another orchideous plant in flower; a new species of *Monachanthus*, differing from the one on which the genus was founded (*M. viridis*, Lindl.) in its 3-lobed fringed labellum. The pseudo-bulbs are about 6 inches long, and its flowering stem rises to the height of about 15 inches, bearing nine greenish-yellow flowers. Though I made a diligent search, I could find but one specimen. Near this place I collected *Stachytarpheta prismatica*, and a *Pteris* about the size of *P. aquilina*, which appears to be a troublesome weed in cultivated ground.

About sixteen or eighteen miles west from Pernambuco there is a German colony. It was first settled about ten or twelve years since, at the breaking up of a German regiment which had long been in the service of the Brazilian government here. The colonists gain their livelihood principally by making charcoal. It is called Catuca. Being desirous of spending a day or two at this place, I started early one morning in the beginning of November, accompanied by a young Englishman with whom I had first made acquaintance in the Organ Mountains, and guided by two Germans who were returning thither from Pernambuco, whose horses carried our luggage. The route for about two hours lay through a flat country, principally planted with *Mandiocia*, though a great part was still uncleared; the larger trees only having been cut down, and some of these yet remaining and rising high above their fellows of the wood. After passing the cul-

tivated ground and ascending a slight eminence, we entered the Virgin Forest. Previously the road had been of a sandy nature, but now we found it to consist of hard clay. Many of the trees were very lofty, though they do not commonly attain the stature of those in the province of Rio. Among the shrubs that grow below them I observed a few *Melastomaceæ*, *Myrtaceæ* and *Rubraceæ*, also a beautiful scarlet-flowered acanthaceous climber. After riding for an hour through this wood we reached the cleared valley, containing the cottages of the colonists, passing several before we reached the one at which we meant to remain. The buildings are generally small, but much superior in cleanliness and neatness of arrangement to those belonging to the same class of Brazilians. Having partaken of some supper, we slung our hammocks in a small apartment, and enjoyed sound sleep till morning.

My friend being desirous of having a day's hunting in the woods with one of the Germans, I determined to accompany them, in hopes of making some additions to my botanical stores. We set off early, entering the wood about a mile from the cottage. Here, as in similar situations near the town, I observed a great deficiency of herbaceous plants, and in a walk of about two hours only collected a few ferns. Passing through this wood we suddenly came upon another cleared valley, containing the ruins of several cottages. This, we were told, had been the first site of the settlement; but as the Germans were forbidden to cut any more wood in this direction, they moved their quarters a few years ago to the place from which we started. Near these dismantled dwellings we found plenty of pine-apples, and refreshed ourselves with some which were ripe, sheltering ourselves from the sun under the shade of an out-house which had formerly served as a place for the manufacture of *Mandioca*. Moist situations in this neighbourhood afforded plenty of *Contoubea spicata*, while in dry, sandy and bushy places were a few plants of a species of *Cyrtopodium* in flower. In the wood I observed a fine tree covered with long spikes of bright yellow flowers, of which having procured specimens, I found it to be a species of *Vochysia*, with verticillate leaves. Near the same place were many trees, especially by a small stream, of *Moronobea coccinea*, loaded with their globular crimson blossoms; and, in returning, I collected a yellow-flowered *Palicourea*, called "*Matto rato*", which is not, however, the same plant as is known at Rio de Janeiro by the name of "*Erva do Rato*."

Next day I made an excursion into a wood on the opposite side of the valley from the former, where I added a few more plants to my collections, among them a small number of *Orchideæ*, which appear

very rare here. On our return in the afternoon, I saw by the roadside many specimens of *Amaryllis Belladonna*. A few miles further we passed through a natural shrubbery, consisting chiefly of *Eschweilera parvifolia*, beautifully in flower. Shortly afterwards I obtained the blossoms of a small tree, bearing large yellow flowers, which I first saw to-day, and found to be *Cochlospermum serratifolium*. D C. (*Wittelsbachia insignis* of Martius). It grows from 12 to 15 feet high, with straight upright branches; and at the period of inflorescence is almost destitute of foliage, the small quantity that does appear being confined to the not-flowering boughs; while the size and golden hue of the blossoms give the tree a very striking appearance.

Shortly after my return from Catnia I spent a day at the country-house of James Stewart, Esq., a merchant of Pernambuco, to whom I had brought introductions from Rio. His residence is about a mile further than Dr. Loudon's, and being fond of horticulture he possesses a good garden. During a walk which I took with him in the neighbourhood, I collected more flowering specimens, and also ripe seeds of *Cochlospermum serratifolium*, with a species of *Echites* (?) twining on its branches, and bearing pink-coloured and sweet-smelling blossoms. We also met with several small trees of a *Sapindus* in bloom; and in a low wood was *Acacia tortuosa*, a much-branched shrub, about 15 feet high. Near this place I was highly gratified by seeing for the first time the *Gustavia augusta* in flower, many of whose noble pink blossoms were expanded, and were as large as those of the white water-lily, while numbers were just ready to burst.

Close to the coast, and about thirty miles north of Pernambuco, there is a small island called Itamanca; which on account of its peculiar flavour, and the abundance and superior quality of the fruit produced there, is designated as the garden of Pernambuco. Of course I was anxious to visit a place of which I heard so many praises, and for this purpose I started on the morning of the 13th of December, and considered myself peculiarly fortunate in having the company of Mr. Oliver Adamson, a young gentleman from Glasgow, who is in a merchant's office at Pernambuco. He is particularly fond of the study of nature, and collects plants for one of his relations. To make the voyage to Itamanca, we hired a *jangada*, one of the raft boats which are so common in this part of the Brazilian coast. It consists of six pieces of a very light kind of wood, a species of *Apeiba*, each about twenty-five feet long and two feet in circumference, pinned and lashed together. The *jangada* commonly carries one large sail, and is manned by three men. The model of one which Dr. Loudon gave

you when he last came home will best convey an idea of this most insecure looking kind of boat ; and had I not been repeatedly assured that, primitive as the construction appears, these vessels are perfectly safe, I should have felt some hesitation in embarking upon one of them. Having got our luggage, paper, &c. properly placed, so as to be out of reach of the water which constantly washes over these rafts, we commenced our voyage. The wind almost always blows at this season from the north, so that it was right against us, obliging us to beat up so as to keep between the coral reef and the shore, the distance between which varies from a quarter of a mile to two miles, all the way from the town of Recife to the island of Itamanca. At four in the afternoon we found that the unfavourable wind had prevented our performing more than half the way, and we therefore determined to land at a small fishing village, called Pao Amarella, and there pass the night. It was with some difficulty that we obtained a shelter wherein we could sling our hammocks. After meeting with many refusals, the owner of a venda pointed us to an empty hut made of cocoa-nut leaves, and permitted us to take possession of it for the night. Hither, therefore, we moved our luggage, and after a supper of stewed fish and farinha slept soundly till day-break, soon after which we took a walk into the country. The soil is very sandy, and we found that all the herbaceous vegetation had been so dried as to be completely scorched up. One or two small shrubs were in flower, and in a moist shady place was a tall blue-blossomed *Herpestes* that was new to me. After breakfast we continued our voyage. At this place the reef is about a mile distant from the shore, and distinctly perceptible along its whole line both at high and low water ; the ebb tide leaving the rocks bare, and the white surf of the breakers marking its position even at the highest tide.

The wind having now shifted somewhat to westward we were enabled to proceed, and as we made much more rapid progress than the preceding day, we reached the island at noon, and landed on the south-east end at a little village called Pelar. We carried two or three letters of introduction, and the first which we delivered obtained us quarters, where we remained during our stay. The name of our host was Senhor Alexandre Alcantara, the proprietor of a salt work, of which there are several on the island.

Shortly after our arrival we took a walk into the country, in the direction of our landlord's salt-pits, and found its whole general appearance very different from the vicinity of Pernambuco. Instead of the almost uniformly level character of the latter there is a gentle

undulation of hill and dale. There is not much large timber, the wooded parts generally consisting of small trees and shrubs, which give to many parts of the island an aspect more like that of an English orchard than an uncultivated equatorial island. Some of the views that we obtained from the hills over which we passed, if not the grandest, were at least the most delightful that I had seen in Brazil. The trees we found to consist chiefly of gempapo (*Genipa americana*), a beautiful large tree, with dark green foliage and pale yellow flowers; the cashew (*Anacardium occidentale*) of which the curious fruit was ripe, the juice of the large receptacle on which the nut is placed affording a most grateful beverage to the wearied traveller; also a fruit tree, abundant both here and about Olinda, the *Manguaba* of the Brazils, which is of small growth, belonging to the natural order *APOCYNÆ*, and having much the general appearance of an ordinary apple tree, though its small leaves and drooping branches more resemble those of the weeping birch. It bears a yellow fruit, a little streaked with red on one side, about the size of an Orleans plum, and of delicious flavour, which is brought in great quantities to market. *Curatella americana* is also common, and we procured both flower and seed of it: the natives call it *Cashew brava* (wild cashew) from the similarity of its leaves to those of the *Anacardium*. We also saw some fine large trees of a species of *Juga* (?) with long bipinnate leaves, and the tips of their branches bearing many grand spikes of small yellow flowers. By felling one of the trees we obtained specimens of it. Another kind of *Juga* with spikes of minute white blossoms was also of frequent occurrence. Some of the shrubs that we met with here were particularly beautiful, especially a *Byrsoneona*, about twelve feet high, of which the broad foliage was woolly, and the inflorescence spicate with bright yellow blossoms; and a *Gomphia* of nearly the same size, bearing a profusion of equally golden flowers.

During the afternoon we walked along the shore to the northward and picked up a few shells, among which were fine specimens of a species of *Ianthina* containing the animal. Many *Portuguese men-of-war*, as the *Physalis pelagia* is commonly called, had been lately thrown on shore. In a rocky place near the sea we found *Jacquinia armillaris*, and a little further on, in flat sandy spots, *Sophora littoralis* in great abundance.

Two days before quitting the island we walked nearly across it, and visited one out of the three sugar plantations which are on it. This excursion made considerable additions to our collections. On

a dry hill covered with low shrubs we found great plenty of *Krameria ixina*, and a species of *Clusia*, with large white flowers, and attaining the stature of a small tree.

The island is about three leagues in length and half as much across, and is said to contain upwards of 2000 inhabitants, who derive their principal subsistence from fishing, and though apparently very poor showed us much hospitality. Though there are both a lawyer and a priest among them they have no medical man; and as soon as it became known that I was such, I was consulted by great numbers. Two of my patients were in the last stage of consumption, but by far the greater proportion of cases were the results of intermittent fever, chiefly consisting of derangement in the digestive organs, especially the spleen and liver. As I would receive no fees, many were the presents which the grateful creatures made me, and I was loaded with fish, fowls, and fruit.

On my return to Pernambuco, I found that about fifty species of living plants, and upwards of 700 specimens had been the amount of my collections during the four days we had passed on the island of Itamancá.

G. GARDNER.

The collections of dried specimens have safely reached this country, and we cannot but congratulate this enterprising botanist on the success of his labours in the present instance (including a few from Rio, which were not considered worthy of being added to the sets for general distribution) amounting to upwards of 490 species, in very fine preservation, with the numbers and localities attached to them, and occasionally, when they could be determined, the names also. They prove in the different character of the species how very dissimilar is the vegetation of Pernambuco: very few *Orchideæ*, very few ferns, and comparatively few Monocotyledons: rich in *Compositæ*, *Melastomaceæ*, *Myrtaceæ*, *Leguminosæ*, &c. &c. Several of the rarities of this collection are already engraved for our forthcoming volume (the 3rd) of the '*Icones Plantarum*.'

We hope shortly to give an account of Mr. Gardner's excursion into the interior of the province of Pernambuco.

BIBLIOGRAPHICAL NOTICES.

A Monograph on the Anatidæ or Duck Tribe. By T. C. EYTON, Esq., F.L.S., F.Z.S. 4to. London, 1838.

The various works which are constantly appearing on natural

history, and on ornithology in particular, show that the taste for this study is rapidly increasing in the country. Here we have a splendid 4to volume devoted to a single family of birds, and that one certainly not the most attractive in external appearance, though exceedingly interesting for the peculiarities of their anatomy. On this part of the subject the author has bestowed considerable attention, and indeed prides himself on having been the first who has "made use of anatomical characters for divisions."

The work is divided into two parts; the first consisting of the characters of the tribes and genera of the family. This part is illustrated in two series of plates representing the skeleton and trachea of a bird of each of the tribes; while each of the genera is accompanied with a wood-cut representing the bill and foot of the type species of the natural size.

The second part consists of a description of all the known species of the family, amounting to 125 in number, six of which are beautifully figured by Mr. Gould. Each of the species is accompanied by a specific character in Latin and English, and a short English description with a few select synonyma, and some short remarks on its habits and general geographic distribution. Indeed the author appears to have paid considerable attention to the latter part of the subject, and at the end of the work has given a table showing the position of each species, either as a permanent resident, occasional visitor, or migrant, in each of the five ranges into which Dr. Prichard divided the world.

The work, as far as we know, is quite unique of its kind in any language, and is well worthy of the taste and talent of the author: it is much to be hoped, when he finds how well he has succeeded with this intricate group, and that there are materials in this country such as he has here brought together to occupy his leisure, that he will take up some of the other families in succession. For however others may disagree with his views in some particulars, all must agree that the plan which the author has adopted is one that must greatly advance the study of ornithology, and the knowledge of the different species of birds. The only improvement that we would suggest is, that the author should pay more attention to the synonyma, especially to those of the original authors, from whence Latham, Gmelin, Vieillot and others have taken their descriptions, as Bonaparte has so well set the example in his revision of the 'Synonyma of the American Birds.' We are aware that the comparing of birds with the original descriptions of different authors is a wearisome process, and one which few but professional zoologists

will undertake ; but it is one highly advantageous to the progress of the sciences ; and to one who knew the species of ducks as well as the author, it would have been a work of comparative facility.

The Bee-Keeper's Manual. By Henry Taylor. pp. 78. Groombridge.

This little tract, though not of much pretension, and in a cheap form, appears to have the merit of being judiciously arranged and well adapted for practical purposes by one who had devoted his attention to the subject as a favourite pursuit. It was designed, the author informs us, as "a brief practical compendium of the management of Bees, and in particular on the humane or depriving system, in collateral ventilating boxes, as constructed by himself."

"On reviewing his experience as a bee-keeper," he adds, "the author was led to believe that the result of it, added to a concise view of such particulars as are usually spread over a large surface in works of this nature, and arranged according to the progressive order of the seasons, might be useful to others, seeking like himself occasional relaxation from weightier matters, in watching over and protecting these interesting and valuable insects. Step by step, this or that defect of construction in his hives had been remedied, and such conveniences added, as necessity or the spirit of improvement from time to time had suggested. These are briefly described in the following little work."

Mr Taylor concludes his Manual, in which he states that "he has confined himself entirely to matters of practice," with the following remark : "My attention has been chiefly directed to the mechanical part of bee-keeping. Beyond this I have no leisure or opportunity to go, although doubtless much remains to be done in the pursuit of scientific investigation. Those who wish to enter into the question of the internal œconomy and the general physiology of the honey-bee may consult a variety of works. The principal of these are quoted in Mr. Huish's and Dr. Bevan's elaborate publications, in which are detailed a number of valuable facts, together with the results of many experiments."

Of Dr. Bevan's copious and highly interesting work, "The Honey Bee," a new and improved edition has been just received, and will claim our early notice.

Monograph of the Genus Cœnotheca.

We are happy to be able to state that a "Monograph of the Genus Cœnotheca" is in preparation, with drawings from the pencil of

Mrs. Edward Roscoe, of Liverpool; and descriptions by the Rev. William Hincks, F.L.S., of York. The work will appear in Numbers, in 4to, each of eight plates, price 10s. 6d., and will extend from seven to ten numbers. We know that every facility will be afforded to this accomplished lady, especially by specimens from gardens, to make this work worthy of the public patronage. The plates will of course be coloured, and executed in lithography by M. Gauci.

British Flora. Fourth edition.

The fourth edition of Sir W. J. Hooker's *British Flora* (containing the phanogamous Plants and Ferns) has lately appeared, with considerable alterations and additions. We may mention particularly that the present volume is accompanied, without any additional cost, by four plates of numerous figures, beautifully executed in lithography: two of these plates are devoted to the illustration of all the *genera of the grasses*; the other two to those of the *umbelliferous plants*, which will tend materially to facilitate the student in attaining a knowledge of those interesting but difficult tribes.

The same author has recently published the first part, with twelve beautifully coloured plates, imperial 8vo, of his '*Genera Filicum*,' from drawings executed by Francis Bauer, Esq., Botanic Painter to Her Majesty; also the sixth part of the Botany of '*Capt. Beechey's Voyage*,' and the ninth part of the '*Flora Borcali-Americana*'.

Linnaea, ein Journal für die Botanik, &c. Vol. XI. Parts 4, 5, & 6. Vol. XII. Part 1. 1838.

Excursion from Trieste to Istria in the spring of 1833, with an especial reference to Botany. By M. Tommasini and Dr. B. Biasoletto.—Remarks on *Grabowskia*. By G. A. Walker Arnott, Esq.—Reply to Meyer's letter in *Linn.*, vol. xi. p. 106. On the nature of lenticular glands. By Hugo Möhl.—On *Scolecopteris elegans*, a fructifying fossil fern. By F. C. Zenker.—Contributions to the knowledge of *Ceratophylla*. By Dr. M. I. Schleiden.—Description of *Hordeum caeleste trifurcatum*, H. Monsp. By the Editor.—On the writings of Albertus Magnus. By Ernst Meyer.—Monograph of *Gassicurtia*, a genus of variolarius Lichens. By A. L. A. Fée.—On a state of the white-flowered *Salvia pratensis*, in which the stigma was united to the lower lip. By F. A. G. Miquel. Remarks on the fibres of the roots of the higher plants. By E. Ohlert.—Observations on the buds of trees and shrubs. By E. Ohlert.—Description of two new *Melocacti*. By F. A. W. Miquel.—On a new *Atragene*. By Prof. Wenderoth.—Synopsis of the genus *Cassia*. Second Part. By Dr.

T. Vogel.—Descriptions of new and little-known *Cacti*. By F. A. W. Miquel.—Some remarks on *Cassia obovata* and *C. obtusata*, Hayne. By Prof. Wenderoth.—On the rise of sap in plants. By Fr. Kützing.—Contributions to Meyer's *Chloris Hanoverana*. By Thilo Irmisch.—Query concerning *Epilobium denticulatum*. By Prof. Wenderoth.—On the *Hedysarea* of Brazil. By Dr. I. R. Th. Vogel.—An invitation to botanists to support the expedition of Schimper into Abyssinia. By Prof. Hochstetter and Dr. Steudel.

PROCEEDINGS OF LEARNED SOCIETIES.

ROYAL SOCIETY.

May 31.—A paper was read, entitled, "An Experimental Inquiry into the influence of Nitrogen on the Growth of Plants." By Robert Rigg, Esq. Communicated by the Rev. J. B. Reade, M.A., F.R.S., &c.

The author, after briefly alluding to a former paper laid before the Royal Society, describing the chemical changes which occur during the germination of seeds, and some of the decompositions of vegetable matter, proceeds, in the present paper, to trace a connexion between the phenomena exhibited during the growth of plants, and the direct agency of nitrogen. The experiments by which the author supports his views are arranged in separate tables, so drawn out as to indicate not only the quantities of carbon, oxygen, hydrogen, nitrogen, and residual matter, in about 120 different vegetable substances, but also the quantity of nitrogen in each compound, when compared with 1000 parts by weight of carbon in the same substance. The most important of these tables are those which exhibit the chemical constitution of the germs, cotyledons and rootlets of seeds; the elements of the roots and trunks of trees, and the characters of the various parts of plants, especially of the leaves, at different periods of their growth. From this extensive series, which is stated to form but a small portion of the experiments made by the author in this department of chemical research, it appears that nitrogen and residual matter are invariably the most abundant in those parts of plants which perform the most important offices in vegetable physiology; and hence the author is disposed to infer, that nitrogen (being the element which more than any other is permanent in its character) when coupled with residual matter, is the moving agent, acting under the living principle of the plant, and moulding into shape the other elements. The method of ultimate analysis adopted by the author, enables him, as he conceives, to de-

tect very minute errors, and therefore to speak with certainty as to the accuracy and value of every experiment*.

LINNÆAN SOCIETY.

June 5.—Mr. Forster, V.P., in the Chair.

Read observations on the *Spongilla fluviatilis*. By John Hogg, Esq., M.A., F.L.S.

Mr. Hogg is disposed to adopt the opinion of Dr. Johnston of Berwick in referring the sponges to the vegetable kingdom. The lenticular bodies, which occur abundantly in specimens of the river sponge, and which some naturalists, and among others Lamarck, have regarded as the ovaria of the *Cristatella vugans*, Mr. Hogg inclines to consider as the sporules or reproductive bodies of the *Spongilla fluviatilis*. These seed-like bodies occur principally in the cells or pores of the sponge. Mr. Hogg has watched the development of these bodies, for having placed some of them in a glass vessel, replenished daily with fresh water, six of them soon became attached to the bottom of the vessel, and in about three weeks each of them was found covered with a whitish woolly substance, which he took for the commencement of the sponge; but unfortunately their further progress was not observed, from the author being obliged to leave home.

Read also a paper, entitled, on the Number and Structure of the Mammulæ employed by Spiders in the process of Spinning. By John Blackwall, Esq., F.L.S.

The author observes that all the species which have come under his notice are provided with four, six, or eight spinning mammulæ, which are somewhat conical or cylindrical, and composed of one or more joints each: they are usually closely grouped in pairs, which may be readily distinguished from each other by their relative positions. The pair situated near the anus is called by the author superior spinners, and that furthest removed from it inferior spinners, and the mammulæ placed between these two extremes he terms intermediate spinners. Exceedingly fine, moveable papillæ or spinning tubes, for the most part dilated at the base, occur at the extremity of the mammulæ, or are disposed along the inferior surface of their terminal joint, whence issues the viscous secretion of which the silken lines produced by spiders are formed.

Mr. Saunders, F.L.S., presented specimens of *Potamogeton plantagineus* and *Medicago denticulata*, var. *apiculata*, gathered in Sussex.

[* An abstract of Mr. Rigg's paper on the germination of seeds will be found in the Lond. and Edinb. Philosophical Magazine, vol. ix. p. 536: see also the same Journal, vol. xii. p. 31, 232.—EDIT.]

Mr. Hogg, F.L.S., exhibited specimens of *Plumatella repens* and *Spongilla fluviatilis* from a rivulet near Norton in the county of Durham. One of the *Spongilla* was attached to the larva-case of *Phryganica*, and another to a tuft of *Hypnum riparium*, which it had entirely enveloped.

June 19.—Mr. Forster, V.P., in the Chair.

Specimens of the tree which yields the Caoutchouc or India Rubber of Commerce, and which proves to be a species of *Hevea*, nearly related to the *guianensis* of Aublet, were presented by Sir Everard Home, Bart., Capt. R.N.

Read a Description of a new species of *Cattleya*. By Mr. Robert H. Schomburgk. Communicated by the Secretary.

This splendid orchideous epiphyte, remarkable for the beauty and fragrance of its flowers, occurs on trees, which skirt the banks of Currasawaka and other streams which fall into the Rupununy, a river of British Guiana. Mr. Schomburgk has named the species *superba*, with the following characters :

C. superba, sepalis lanceolatis acutis subaequalibus, petalis latioribus oblongo-lanceolatis undulatis denticulatis, labelli trilobi lobo medio subrotundo-ovato dentato apiculato, pseudobulbis angustis, spatha magna foliacea.

Read likewise observations on some genera of Plants connected with the Flora of Guiana. By George Bentham, Esq., F.L.S.

The three genera which form the subject of this paper are *Symplocos*, *Sequiaria*, and *Anthodiscus*. To the first Mr. Bentham very properly refers the *Stemmatosiphon* of Pohl, placed improperly by that author in *Meliaceae*. Mr. Bentham has satisfactorily shown that the degrees of adhesion of the ovarium, and of the cohesion of the petals in *Styracineae* afford only characters of secondary value, and that consequently *Styrax* and *Halesia* must form part of the same natural family. *Sequiaria*, which has been referred along with *Petiveria* to *Phytolaceae* by Mr. Brown, is remarkable for its polyandrous flowers, and its unilocular ovarium, with a solitary erect ovulum and a lateral stigma and the winged pericarpium. The following are the characters of the new species described by the author. Some of them are so like *Securidaca* in appearance that they are frequently confounded in herbaria with that genus.

1. *S. parvifolia*, stipulis minimis tuberculiformibus vix spinescentibus, foliis ovali-oblongis basi in petiolum angustatis herbaceis.
2. *S. coriacea*, stipulis longis validis rectis spinescentibus, foliis subsessilibus oblongis obtusissimis coriaceis.

3. *S. longifolia*, stipulis brevissimis recurvis spinescentibus, foliis subsessilibus lanceolato-ellipticis acuminatis reticulatis coriaceis.
4. *S. floribunda*, stipulis minimis tuberculiformibus vix spinescentibus, foliis breviter petiolatis ovatis acuminatis coriaceis, paniculæ rhachide pubescente.
5. *S. macrophylla*, stipulis spinescentibus recurvis, foliis breviter petiolatis amplis ovato-ellipticis acuminatis, paniculæ rhachide glabra.

The third genus *Anthodiscus* was first described by Meyer in his 'Flora Essequiboensis,' but it has not been taken up in any of the recent systematic works. It belongs to *Rhizoboleæ*. It is distinguished from *Rhizobolus* by its cohering petals, many-celled ovary, with the styles equal in number to the cells. The leaves are ternate and are either opposite or alternate.

BOTANICAL SOCIETY OF LONDON.

April 6.—J. E. Gray, Esq., F.R.S., President, in the Chair.

The Secretary announced a donation of plants, presented by Edmund Lees, Esq., F.L.S., Corresponding Member of the Society, and Local Secretary for Worcestershire; also a donation of books from Mr. W. Baxter, A.L.S. Mr. D. Cooper, A.L.S., delivered his third Lecture on the practical part of Botany; after which the Secretary read a Paper from Robert H. Schomburgk, Esq. (now travelling in British Guiana), on the *Triplaris Americana*, or Ant Tree of Guiana*, which led to some discussion; and thanks having been ordered to be returned to Mr. Schomburgk, the Meeting adjourned until April 20th.

April 20.—Dr. MacIntyre, F.L.S., in the Chair.

The Secretary announced donations of plants and books. The Secretary read a Paper from M. A. Wallis, Corresponding Member of the Society, on the genus *Myosotis*, which led to some discussion between the Chairman, Dr. Bossey, Mr. G. E. Dennes, and other Members, after which the Meeting adjourned until May 4th.

May 4.—John Edward Gray, Esq., F.R.S., President, in the Chair.

The usual business of the evening having been dismissed, the Secretary proceeded to read a letter of thanks from the British Museum for the specimen of *Victoria regia*, which the Council thought necessary to deposit in the Botanical department of that Institution, and which had been transmitted to the Society by Mr. R. Schomburgk, now travelling in British Guiana. Mr. Dennes read a Memoir on *Polygonum Owenii*, which, on account of its interest, he had trans-

* This paper was inserted entire in our last number.

lated from the "Annales des Sciences Naturelles." The Secretary also communicated to the Society some notes on *Lythrum Salicaria*, remarking that he had observed this plant in several stations in the neighbourhood of London, with the leaves variably situated on the stem; and exhibited specimens in which the plant had *alternate opposite*, and *leaves three in a whorl*. These observations, together with other peculiarities noticed by Mr. Denmes, led to an interesting discussion. Mr. Daniel Cooper exhibited and offered for distribution to the Members several of the rarer plants found about Reigate, Surrey, which he had that day expressly collected for the purpose; and stated that it was the intention of several of the Members to collect in a similar way the rarer plants of the vicinity of London, and exhibit them at the monthly nights of meeting throughout the summer. Mr. Cooper called the attention of the Members to specimens of *Paris Quadrifolia*, of which there were plants having from three to seven leaves upon the table, but in no instance had he observed more than five portions of the calyx, and not, as recorded by some authors, a division of the calyx for each leaf found upon the stem. Mr. Gray noticed a peculiarity in the flower of the *Adoxa Moschatellina*; and expressed his approbation of the plan of procuring living specimens of the rarer plants for distribution at the summer monthly meetings, as it would enable many of the Members to examine and make such observations upon the plants as they might think necessary, and who might be prevented from collecting them at the proper period. Among Mr. Cooper's collection were specimens of the early Orchideous plants, comprising *Ophrys apifera*, *O. muscifera*, *Orchis ustulata*, *Platanthera bifolia*, *Listera ovata*, *Aceras Anthropophora*, &c. Specimens of *Leucogonum Æstivum* were also exhibited by the Secretary, which were obtained from the old station in Greenwich marshes, opposite Blackwall.

MISCELLANEOUS.

TWO RECENT SPECIES OF TRIGONIA.

The *Trigonia* of Van Diemen's Land, first described by Lamarck (of which we have an original specimen in the British Museum, presented by that justly celebrated naturalist), and the one discovered by Mr. Stutchbury, in Port Jackson, New Holland, have been considered the same species. The series of specimens from the first

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locality, which I have received from Mr. Ronald Gunn, proves most decidedly, what I had long suspected, that they are very different species, and they may be characterized as follows :

Trigonia margaritacea, Lam. Syst. Anim. sans Vertèb.—Shell rather compressed, with 20 or 23 rather narrow nodulose radiating ribs; the hinder ribs very compressed, all excepting the front ribs wide apart. Hab. Van Diemen's Land. Ronald Gunn, Esq.

Trigonia Lamarckii, Gray.—Shell rather ventricose, solid, with 20 to 26 narrow flat-topped nodulose radiating ribs; the ribs of the hinder slope, narrow, rather crowded; convex, ribs all close together and nodulose. Hab. New Holland, Port Jackson. Mr. Stutchbury.

Varies with the inside white, salmon-coloured, yellow, or purple bronze.

The young states of these two species are so very different that it is astonishing they could have ever been confounded; the Van Diemen's Land species in all its stages of growth is about twice as large as that from New Holland.—J. E. GRAY.

THE SEXES OF LIMPETS. PATELLÆ.

The *Patellæ* have generally been considered as hermaphrodite, but this is certainly not the case, as I have remarked several years ago. But notwithstanding repeated examinations, however, I have not been able to discover any external difference in the animal, except a slight variation in colour, nor is there any difference in the size and form of the shells. In the autumn they are easily distinguished if an incision be made along the right side of the foot, when the males exhibit a white milky glairy fluid; and the females, which before they are cut generally have a darker foot, a great quantity of round eggs (the size and appearance differing according to their state of development) swimming in a transparent viscid fluid. This cannot be the two states of the same fluid, for after examining hundreds of specimens, of different sizes and at various seasons, I have never been able to find them in any intermediate state, although I have found the egg in various stages of development. In their early state they are dark and opaque, but in the later they become more transparent. I have never been so fortunate as to find the foetal state of the animal, showing the primitive form of the shell; but this state may often be seen attached to the tip of the young specimens.

The larger limpets often form on the chalk, cavities the size of their shell, as I have noticed in my paper on the structure of shells, in the Philosophical Transactions for 1833.—J. E. GRAY.

HABITS OF PATELLA PELLUCIDA.

THE animals of this shell are generally described as living on the stem and leaves of the *fucus digitatus*; they are sometimes found on the leaves, but the greater number occur in holes which they have eaten out, on the under side of the root of this plant. These holes are often of an inch or rather more in depth, and the convex form of the face of the shell may arise from the animal living in an almost hemispherical cavity. The *fucus* which they inhabit being confined to the rocks, which are only left dry at very low tides, the animals are only to be procured by tearing up by the roots, which may account for their history being almost unknown; although I find, since this communication was made to you, that it has been described in a neglected paper by Le Gentil, in the *Mémoires de l'Académie* for 1788. The shells are abundant on the coast of Sussex, and near Berwick on Tweed, where I first found them in company with my friend Dr. Johnston.—J. E. GRAY.

METEOROLOGICAL OBSERVATIONS FOR JUNE 1838.

Chiswick.—June 1. Very fine: rain. 2, 3. Cloudy and fine. 4. Fine: rain. 5. Hazy: very fine. 6. Slight haze: fine. 7. Fine. 8. Cold and dry. 9. Fine. 10. Cloudy and fine. 11. Hazy: rain. 12. Rain, with thunder. 13. Fine: heavy rain at night. 14, 15. Overcast: rain. 16. Drizzly. 17. Cloudy. 18. Overcast: heavy thunder showers. 19. Cloudy and windy. 20. Cloudy. boisterous with rain at night. 21. Cloudy and windy. 22. Showery. 23, 24. Very fine. 25. Fine; heavy rain. 26. Hazy: rain. 27. Overcast and fine. 28. Slight showers: very fine. 29. Fine: heavy rain. 30. Fine: rain.

Boston.—June 1. Rain. 2. Fine. 3. Fine: rain A.M. 4. Fine: rain, thunder, and lightning A.M. 5. Fine: heavy rain and hail, with thunder and lightning P.M. 6. Cloudy. 7. Cloudy: rain P.M. 8, 9. Fine. 10. Cloudy. 11. Rain. 12. Fine. 13. Rain early A.M. 14. Cloudy. 15. Fine: rain P.M. 16. Fine. 17. Fine: rain early A.M. 18. Fine. 19. Cloudy: heavy rain early A.M. 20. Rain. 21, 22. Cloudy. 23—25. Fine. 26. Cloudy: rain A.M. and P.M. 27. Cloudy: rain P.M. 28. Fine. 29. Cloudy: rain early A.M. 30. Fine: rain P.M.

Meteorological Observations made at the Apartments of the Royal Society by the Assistant Secretary, Mr. ROBERTSON; by Mr. THOMPSON at the Garden of the Horticultural Society at Chiswick, near London; by Mr. VALL at Boston, and by Mr. DUNBAR at Applegarth Manse, Dumfriesshire.

| Days of Month. 1898. | Barometer. | | | | Thermometer. | | | | Wind. | | | | Rain. | | | | Dew-point. London: Roy. Soc. 9 a.m. |
|-------------------------|------------|--------|------------|--------|----------------|-------|-----------------------------|------------------------|--------------------------------|----------------------------|---------------------------------|--------------------------------|-------------------|----------------|--------------------------------|-------------------|----------------------------------------------|
| | Chiswick. | | Boston. | | Dumfriesshire. | | London: Roy. Soc. | | Chiswick. | | Dumfriesshire. | | London: Roy. Soc. | | Dumfriesshire. | | |
| | Max. | Min. | 8 1/4 a.m. | 9 a.m. | 9 p.m. | Fahr. | Self-register. Max. Min. | Roy. Soc. Max. Min. | London: Roy. Soc. 9 a.m. | Wind. Direction & Force | Dumfriesshire. 9 a.m. 9 p.m. | London: Roy. Soc. 9 a.m. | Direction & Force | Dumfriesshire. | London: Roy. Soc. 9 a.m. | Direction & Force | |
| 1. | 29-974 | 30-032 | 29-886 | 29-55 | | 60-8 | 70-3 52-7 | 72 | 52 | | | NW. | S. | NE. | ... | ... | 56 |
| 2. | 29-836 | 29-908 | 29-770 | 29-36 | | 59-3 | 70-3 52-5 | 70 | 47 | | | S. | SW. | calm | ... | ... | 55 |
| 3. | 29-800 | 29-750 | 29-652 | 29-26 | | 59-5 | 66-0 51-3 | 69 | 49 | | | S. | SW. | calm | ... | ... | 55 |
| 4. | 29-732 | 29-833 | 29-743 | 29-21 | | 61-5 | 66-6 53-6 | 72 | 40 | | | S. | SW. | calm | ... | ... | 54 |
| 5. | 29-924 | 29-964 | 29-903 | 29-37 | | 58-6 | 70-5 50-4 | 74 | 45 | | | SSW. | W. | calm | ... | ... | 54 |
| 6. | 30-052 | 30-108 | 30-085 | 29-55 | | 52-7 | 69-3 51-0 | 57 | 43 | | | NW. | N.E. | calm | ... | ... | 54 |
| 7. | 30-212 | 30-264 | 30-157 | 29-72 | | 54-9 | 58-7 50-6 | 64 | 40 | | | NW. | N. | calm | ... | ... | 51 |
| 8. | 30-304 | 30-322 | 30-247 | 29-82 | | 51-7 | 64-3 44-2 | 66 | 35 | | | NW. | N. | calm | ... | ... | 51 |
| 9. | 30-240 | 30-290 | 30-021 | 29-24 | | 59-0 | 70-3 47-0 | 68 | 43 | | | NW. | S. | calm | ... | ... | 42 |
| 10. | 29-798 | 29-850 | 29-580 | 29-36 | | 59-3 | 64-2 50-5 | 66 | 51 | | | SW. | S. | calm | ... | ... | 48 |
| 11. | 29-518 | 29-590 | 29-493 | 29-12 | | 55-2 | 63-0 52-3 | 67 | 49 | | | S. | E. | calm | ... | ... | 50 |
| 12. | 29-564 | 29-677 | 29-593 | 29-12 | | 55-7 | 60-8 52-4 | 72 | 42 | | | S. | E. | calm | ... | ... | 53 |
| 13. | 29-682 | 29-750 | 29-677 | 29-22 | | 56-8 | 62-8 50-8 | 69 | 47 | | | NW. | W. | calm | ... | ... | 54 |
| 14. | 29-744 | 29-800 | 29-723 | 29-20 | | 59-8 | 63-0 51-2 | 67 | 52 | | | NW. | S. | W. | ... | ... | 54 |
| 15. | 29-784 | 29-844 | 29-678 | 29-25 | | 60-7 | 64-5 54-0 | 73 | 49 | | | S. | S. | W. | ... | ... | 55 |
| 16. | 29-800 | 29-850 | 29-810 | 29-23 | | 61-8 | 65-6 54-8 | 76 | 58 | | | S. | S. | calm | ... | ... | 54 |
| 17. | 29-888 | 29-948 | 29-747 | 29-26 | | 63-5 | 70-4 60-3 | 75 | 65 | | | S. | S. | calm | ... | ... | 60 |
| 18. | 29-682 | 29-678 | 29-562 | 29-06 | | 68-3 | 71-5 61-0 | 76 | 54 | | | ENE. | S. | calm | ... | ... | 62 |
| 19. | 29-826 | 29-905 | 29-849 | 29-08 | | 63-8 | 71-7 54-7 | 72 | 53 | | | S. | SW. | calm | ... | ... | 68 |
| 20. | 29-736 | 29-792 | 29-583 | 29-20 | | 61-0 | 67-3 56-2 | 64 | 57 | | | S. | SW. | W. | ... | ... | 62 |
| 21. | 29-590 | 29-701 | 29-640 | 28-96 | | 60-8 | 67-2 59-0 | 72 | 51 | | | SW. | SW. | W. | ... | ... | 58 |
| 22. | 29-860 | 29-984 | 29-857 | 29-21 | | 62-4 | 72-3 53-6 | 71 | 46 | | | SW. var. | SW. | W. | ... | ... | 57 |
| 23. | 30-192 | 30-212 | 30-099 | 29-55 | | 62-4 | 72-6 51-7 | 77 | 45 | | | NW. | S. | W. | ... | ... | 56 |
| 24. | 30-052 | 30-115 | 30-008 | 29-44 | | 66-7 | 79-7 54-8 | 83 | 55 | | | NW. | S. | W. | ... | ... | 59 |
| 25. | 30-090 | 30-142 | 30-007 | 29-46 | | 68-3 | 77-3 61-6 | 79 | 56 | | | NW. | S. | W. | ... | ... | 61 |
| 26. | 30-000 | 30-060 | 29-962 | 29-40 | | 57-4 | 72-8 56-0 | 68 | 53 | | | NW. | E. | N.W. | ... | ... | 60 |
| 27. | 30-044 | 30-090 | 29-993 | 29-42 | | 65-0 | 74-6 57-0 | 65 | 54 | | | N. | N.E. | calm | ... | ... | 59 |
| 28. | 30-050 | 30-100 | 29-948 | 29-46 | | 62-9 | 66-3 57-3 | 73 | 49 | | | SW. | N. | calm | ... | ... | 58 |
| 29. | 29-998 | 30-050 | 29-959 | 29-40 | | 62-8 | 72-8 54-3 | 74 | 44 | | | S. | S. | calm | ... | ... | 57 |
| 30. | 29-974 | 30-028 | 29-844 | 29-40 | | 62-8 | 72-7 52-0 | 74 | 52 | | | W. | S.W. | calm | ... | ... | 56 |
| Mean. | 29-898 | 29-921 | 29-839 | 29-33 | | 60-5 | 68-6 53-6 | 70-83 | 48-96 | 59-8 | | | | | Sum. 3-65 | 2-86 | Mean. 55-4 |

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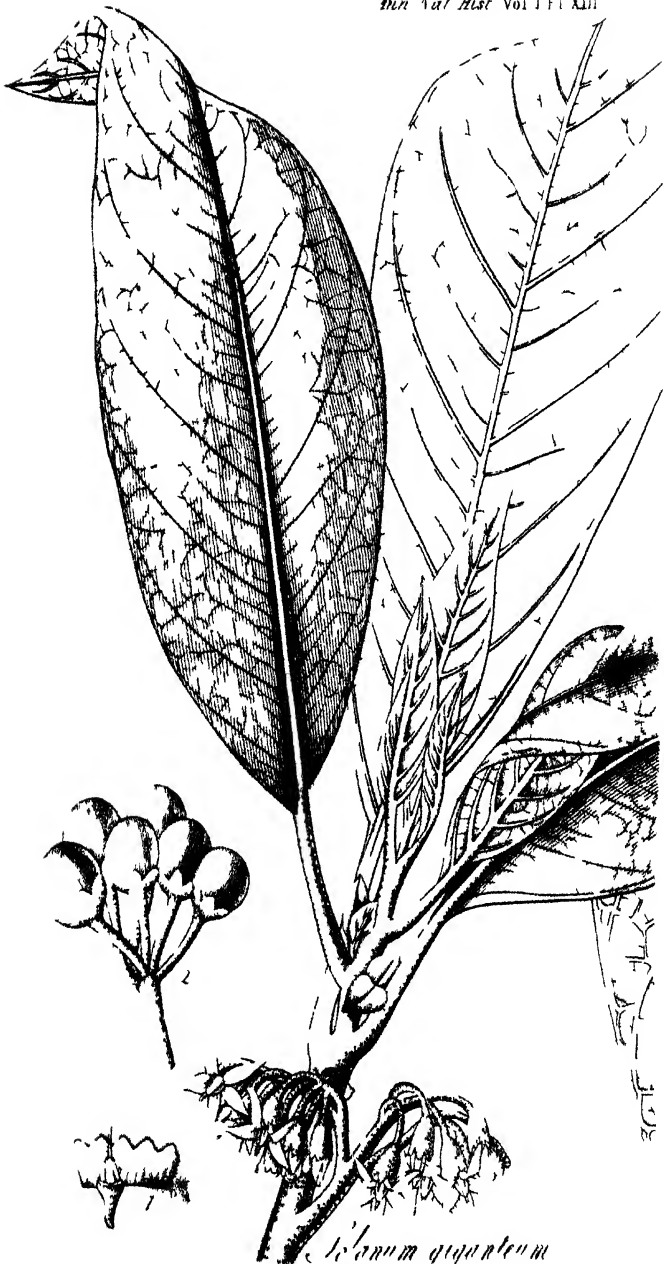
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